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ABRIDGMENTS

OF THE

Specifications

RELATING TO

WATCHES, CLOCKS, AND OTHER TIMEKEEPERS.

PRINTED BY ORDER OF THE COMMISSIONERS OF PATENTS.

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PREFACE.

The Indexes to Patents are now so numerous and costly as to be placed beyond the reach of a large number of inventors and others to whom they have become indispensable.

To obviate this difficulty, short abstracts or abridgments of the Specifications of Patents under each head of Invention have been prepared for publication separately, and so arranged as to form at once a Chronological, Subject-matter, Reference, and Alphabetical Index to the class to which they relate. As these publications do not supersede the necessity for consulting the Specifications, the prices at which the latter are sold have been added.

Many Specifications being yet unpublished, the only guide in discriminating subjects in such cases has been the titles of Patents, which are frequently defective, and may therefore have led to an occasional omission.

When the entire series of Specifications shall have been printed it is intended to publish a new and complete edition of these Abridgments ; meanwhile, the manifest usefulness of such works, and the urgency of the demand for copies, have been considered a sufficient justification for the present issue, In the present series of Abridgments several Inventions are noticed which embrace the application of electricity. The parts of these which relate to the batteries employed, and to the modes of generating the electric currents, are not comprised in this series, but will be more fully noticed in the series relating to such subjects. In some cases, therefore, it may be necessary for persons interested in the above-mentioned class to refer to that series.

B. WOODCROFT.

INDEX OF NAMES.

[The names of persons by whom inventions have been communicated from abroad, when known, are printed in *Italic.*]

Page
Adams, J. 104
Addison, J. 78
Arnold, J. 10, 11
———, J. R. 33

Bailey, T. 76
Bailly, J. L. G. 120
Bain, A. 47, 50, 55, 61, 73
Baker, T. 39
———, W. 98
Banister, J. 40
Barwise, J. 47
Bell, J. T. 36
Bellford, A. E. L. 99
Bennoch, J. 21
Berrollas, J. A. ...26, 27, 36, 37
Bold, J. 121
Bond, G. A. 22
Booth, E. 2
Boreham, S. 86
Bosley, J 3
Bradshaw, J. 100
———, W. 100
Brett, A. 60
Brewer, C. 110
Brown, I. 38
———, W. 71

Cartwright, B. 3
Chancellor, J. 28
Chater, J 14
Chauffourier, P. A. 69
Chavanes, A. 98
Choisnet, U. C. 101
Clark, R. 67
Cole, J. F. 33
———, R. 16
Congreve, W. 25
Cummins, C. 91

Page
Davies, J. C. 45
Day, S 21
Debanfre, J. 2
———, P. 2
De Lafons, J. 23
Dent, E. J. 39, 46, 49
Dering, G. E. 95
Detouche, C. L. 116
Dobell, E. 93
Doret, P. H. M. 91
Durillier, A. F. D. 96

Edwards, F. 83
Eiffe, J. S. 66
Elliot, J. M. 22, 23
Evans, R. 3

Facio, N. 2
Fatton, F. L. 34, 35
Fischer, J. 13
Freeman, J. 8

Gandibert, H. 105
Gardner, W. 106
Gärtner, C. M. E. 118
Giajola, C. E. 101
Glover, J. 121
Gougy, P. F. 43
Gould, C. 21
Gout, R. 20
Gowland, J. 41

Hadley, J. 2
Haley, C. 18
Hanson, C. 56
Harcourt, J. 77
———, W. 77
Harlow, S. B. 14
Harris, T. 8
Hatcher, W. H. 63

Page
Haywood, P. 7
Hees, R. V. 119
Heinhold, E. 97
Hill, A. 1
Hoffstaedt, A. J. 72
Holl, F. R. 74
Hopkins, J. 80
Houdin, J. J. E. R. 116
Houghton, W. 2
Huguenin, G. 105
Hunt, S. 31
Hutton, J. 58

Ingold, P. F. 50, 52

Jaccard, A. P. 103
Johnson, E. D. 109, 115
———, J. H. 102
Johnston, J. 46

Kammerer, R. 110
Kammerer, R. 119
Kehlhoff, F. 7
Kennedy, T. 75
Kibble, H. 83
Knipsehaar, A. A. M. 84
Knowles, T. 96

Lane, U. 94
Le Mesurier, F. 88
Leslie, R. 16
Litherland, R. 31
———, P. 15
Little, G. 60
Littlewort, G. 39
Loseby, E. T. 80
Luedeke, E. 77
Lund, J. R. 52

Macdowall, J. E. 42
Mackenzie, C. 15
Manton, J. 24
Marie, D. 5
Marsh, T. 28
Massey, E. 28, 30, 33, 42, 48
———, E. J. 41
———, F. J. 47

Page
Mathew, D. D. 24
Matthias, W. J. 76
Maurel, T. Z. L. 90
M'Dowall, C. 73
Mesure, L. 115
Meusnier, G. 92
Millar, C. 79
Minton, H. 72
Mitchell, W. S. 118
Moenck, G. 66
Moinau, A. 44
Molyneux, R. 44
Morley, H. 11, 12
Morton, G. 119
Muma, J. 115
Mylne, G. E. 52

Newton, A. V. 102
———, W. 43
———, W. E. 58, 84, 87
Nicole, A. 54
———, D. L. A. 106
Nolet, C. 85
Norton, E. 8
Noyer, P. 117

Ogston, J. 36
O'Keefe, J. 89
O'Keeffe, J. 78
Osman, H. F. 117

Pace, J. 39
Payne, W. 69
Peace, W. 97
Peckham, J. R. 20
Peppe, G. T. 71
Perrin, C. H. 50
Perrot, H. L. R. 104
Philcox, G. 43, 57, 78
Pierret, V. A. 100
Piggott, W. P. 55
Poncy, J. P. I. 45
Poole, M. 103
Power, E. 96
Preddy, W. 71
Prest, T. 33

Page
Prior, G. 32
Pritchard, T. 111

Quaife, T. 88

Radford, J. 94
Recordon, L. 10
Reeder, R. 119
Rentzsch, S. 29
Restell, T. 67, 76
Richaux, L. A. R. 114
Roberts, R. 68
Robinson, J. 106
Roper, W. 82
Rowbotham, J. 79
Rowning, J. 3

Sanderson, G. 4, 6
Sandoz, A. 91
Sant, G. 90
Savage, G. 24
Schmidt, J. 26
Seyffert, F. W. 32
Shapple, H. 71
Shepherd, C. 69
Small, W. 9
Smeeton, J. 87, 92
Smith, E. 98
——, S. 29
Stuart, H. 111

Page
Thomas, Y. M. 116
Tiffereau, C. T. 72
Tobias, M. 29
Tolhausen, A. 115, 116
Trotman, S. 96
Trusted, C. 19
Tunks, D. 101
Tyrer, T. 10

Ulrich, J. G. 35, 37, 39, 40, 112

Walker, W. 48
Wall, W. 31
Watson, J. F. 120
——, J. J. W. 87
Weare, R. 65
Webb, J. 82
Weber, J. V. 98
Webster, H. 105
——, R. 8
Westfield, R. 30
Westwood, R. 38
Whele, E. 74
White, J. 14
Whitehouse, E. O. W. 108
Williams, W. 71
Worcester, Marquess of 1
Wright, T. 12

Yates, T. 60

WATCHES, CLOCKS, AND OTHER TIMEKEEPERS.

A.D. 1661, February 8.—N° 131.

WORCESTER, Edward, Marquess of.—1. “To make a watch “ or clocke without string or chaine, or any other kind of winding “ vpp but what of necessity must follow if the owner or keeper “ of the said watch or clocke will know the houre of day or “ night, and yett if hee lay it aside severall dayes and weeke “ without looking or medling with it, it shall goe very well, and “ as justly as most watches that ever were made.”

2. Relates to guns and pistols.

3. Relates to carriages.

4. Relates to boats.

(Extract from the Signet Bill, dated 15th November, A.D. 1661.

[No Specification enrolled. See Register of Arts and Sciences, vol. 3, p. 237; and Stuart's Anecdotes of Steam-engines, vol. 1, p. 41.]

A.D. 1664, March 3.—N° 143.

HILL, Abraham.—1. Relates to carriages.

2. Relates to guns and pistols.

3. Relates to breaking and dressing hemp and flax, and watering linen.

4. “A new way of makeing of watches and clocks to bee vsed “ at sea for exact measuring of tyme, towardes the finding the “ longitude and knowing the true course and place of a shipp, “ differenced from all other sorte of watches by having, instead of “ a ballance, a rodd of wyer, or a thynn narrow plate, with a “ weight at the lower end thereof, called a pendulum, and at the “ vpper end an arme with twoe catches or holes to moue it, and “ certaine crooked places or cheekes for regulating the motion

" thereof, which motion is ꝑduced by one or more springs or " weights, the said watches being fitted with balls and socketts to " hang by for goeing steadily at sea."

[No Specification enrolled. Letters Patent printed, price 4*d.*]

A.D. 1693, March 3.—N° 315.

HADLEY, John.—1. Giving motion to machines and carriages, &c.

2. " A contrivance of measuring time a more compendious way, " with one wheele onely, which will goe much more exact then " movements with multiplicity of wheeles, which will be of very " great vse and advantage both by sea and land."

[No Specification enrolled. Letters Patent printed, 3*d.*]

A.D. 1695, September 23.—N° 344.

BOOTH, Edward, and HOUGHTON, William.—" A new " sort of watch or clock with the ballance wheele or swing wheele " either flatt or hollow, to worke within and crosse the center of " the verge or axis of the ballance or pendulum, with a new sort " of teeth made like tinterhookꝭ, to move the ballance or pendulum withall, and the pallettꝭ of the axis or verge of the " ballance or pendulum are to be circular, concave, and convex, " or other teeth or pallettꝭ that will not goe but by the helpe of " the spring to the ballance, which will make such watch or clock " goe more true and exact, and be of greater vse to our subiectꝭ " both at sea and land, than any other heretofore made or now " used."

[No Specification enrolled. Letters Patent printed, 3*d.*]

A.D. 1704, May 1.—N° 371.

FACIO, Nicholas, DEBANFRE, Peter, and DEBANFRE, Jacob.—" An art of working pretious or more com̄on stones " (whether naturall or artificial), christal, or glass, and certain " other matters different from metals, so that they may be employed and made vse of in clockwork or watchwork and many " other engins, not for ornament only, but as an internal and

" vsefull part of the work or engine itselfe, in such manners as " have not heretofore been vsed."

[No Specification enrolled. Letters Patent printed, 3*d*.]

A.D. 1716, July 31.—N° 407.

EVANS, Robert.—" Two circular movements (performed by " two chaines, which " the patentee " calls his endlesse chaines) " of great vse in jackwork," to which movementꝭ he hath added " a new circular spring, which is so contrived as to force the jack " round, even during the winding vp, by a contrary moc̃on ;" the same movements " will be of the same vse in clockwork, and in " some sort of water works."

[No Specification enrolled.]

A.D. 1732, January 11.—N° 535.

ROWNING, John.—" A new invented clock, which with only " one set of wheels besides the watch part may be set in the " com̄on course of its motion to strike the hours only, or the " hours and quarters, or the past hours with each quarter, or to " be silent, and also, by pulling a string, repeats both hour and " quarter."

[No Specification enrolled. Letters Patent printed, 4*d*.]

A.D. 1749, January 31.—N° 639.

CARTWRIGHT, Benjamin.—1. Relates to candle snuffers.

2. A secret spring to secure a watch in the pocket or to the side. The spring is fastened to the wearer's dress by a string or two small screws, and the watch chain falls into or is attached to a loop, which by an easy pressure locks so as to prevent the watch from falling out of the pocket or being snatched from the side. The loop may be easily opened again by touching a small knobb or button.

[Specification printed, price 3*d*.]

A.D. 1755, March 1.—N° 698.

BOSLEY, Joseph.—1. Increasing the number of teeth in the small pinions throughout the whole movement of repeating and other watches. The pinions consequently become larger, and the wheel that leads them goes farther from the centre. A wheel and pinion more than commonly used, is necessary to prevent the watch going down before the usual time, but each wheel leading its pinion so much farther from the centre, lessens the friction. The balance wheel goes the contrary way. The inventor expressly avoids confining himself to any particular numbers in the increase of the teeth.

2. A new-invented slide, which slide has no wheel attached to it. " The index turns upon a brass sockett, and points to an arch of " a circle, divided with the word faster on one end, and the word " slower on the other; and the index may be made with a cock " to keep it down, or with screws, or with springs."

[Printed, 4*d*. See Rolls Chapel Reports, 6th Report, p. 157.]

A.D. 1761, June 25.—N° 763.

SANDERSON, George.—" Tools and engines for the preparing, " stamping, fixing, turning, cutting, and finishing" parts of a watch. 1. A universal engine lathe, consisting of a mandril on which the several parts are to be fixed, in order to be cut or turned by means of the screw, which is cut at the end, in order to fix on the brass collets that are intended to hold the parts to be worked; a dividing plate, on which is fixed the numbers made use of for cutting the cock, pottance wheels, or any other part of a watch. This mandril is made hollow about half way through from the screw, in which works a small arbor up and down by means of a spiral spring lodged in the bottom, which always presses the end of the screw forward. There are also four cutting frames, two of which carry circular cutters, and the other two have square holes, through which a piece of steel is put and fastened by a screw, the end of this steel being fashioned according to the form of the thing to be turned. These cutting frames can be turned up and applied towards the screw end of the mandril, and their position can be altered and adjusted.

2. A screw-press, in the bottom of which is placed a die with a number of fixed centres, to operate as centre punches, for the accurate dispatch of marking the pillar plates for drilling.

3. A tool for cutting screws with a circular cutter. A large screw has a hole through it lengthwise, and the wire to be cut is

passed through and fastened in this. The cutter is then sunk as deep on the wire as necessary; this being done at a notch in one of the poppet heads pf the frame to which the engine is attached. The screw is then moved forward, and it carries with it the wire and causes it to be cut.

4. A brass or iron collet, with three broad headed screws in it, under which are to be placed the watch-plates after they are hardened and filed flat on one side, in order that a cutting frame may drop upon it, and strike a circle intended to adjust the thickness, after which the circle is to be filed out. The above may be used for the cocks, wheel, cap, or any part of a watch where an exact thickness is required.

5. A collet to turn the pillar plates upon after filed of a thickness, which is done by turning one of the frames up against it, to turn off the edge and bring it to size.

6. A collet to turn the upper plates upon, the square pottance holes being cut before these are turned.

7. A piece of iron, like a sugar loaf, to be screwed up tight against the plates by means of a screw on one of the poppet heads, to be used for making the plates round, by turning or cutting off the corners.

8. A steel pottance die. A hole is drilled through the die, which is intended to strike the pottances back in case they stick in the die.

9. A pattern for the pottance brass to be cast by. The tails have to be sawed through, being intended for two.

10. A cutting frame for crossing watches, which is to be substituted for any of the four cutting frames mentioned above. The crosses are cut by an oval cutter.

[Printed, 7*d*,]

A.D. 1762, April 20.—N° 771.

MARIE, David.—The watch is wound up with a single turn, in consequence of the barrel having but one turn, goes thirty hours, and also during the time of winding up, by reason of the last turn of the spring only being made use of. There is no chain or fuzee. As to wheel and pinions, the first is the pinion to the barrel which winds up the spring, and has six teeth, and plays into a steel wheel of eight teeth, which last wheel has a large plain tooth, and prevents the watch being over wound. A click plays into a "rochett" and prevents the watch being wound the wrong way. A bar fixed to the barrel keeps the spring in its proper strength. The large brass wheel fixed to the centre, the second wheel, the third or centre wheel, the fourth wheel, the fifth wheel, and the balance wheel are placed according to a callipper to the specification annexed. The rest like as in other watches.

[Printed, 5*d*. See Rolls Chapel Reports, 6th Report, p. 132.]

A.D. 1762, April 20.—No. 777.

SANDERSON, George.—A lunar and calendar watch key. There are two wheels one of which has one hundred and seventy-seven teeth cut on its edge, with the days of the moon's age expressed on it; the other wheel has one hundred and eighty-six teeth cut on its edge, with the days of the month expressed upon it. These wheels are in a case or cover having apertures on either side to show the various figures, and they are moved forward at the time of winding up the watch by means of a worm or endless screw in that part where common watch keys are generally rivetted. The winding up of the watch (generally done in six revolutions) moves the figure on each side one day forward. In months having less than thirty-one days the day or days remaining must be passed over by giving the key six revolutions for each day. The lunar plate will thus have to be turned back to its proper figure, which is done by a knob for that purpose. There is also a nut or screw to tighten the key when slack, and a catch to prevent accidental turnings. By another circle of figures inside that of the moon's age, divided into twenty-four parts, and having the twelve hours of the day repeated or doubled, the time of high water at London Bridge may be shown, and by making this inside circle to slide or move upon the moon wheel, the time of high water at any other place may be shown. Another circle inside this, having a curved line drawn on it, shows at another aperture the increase and decrease of the moon. By another wheel may be shown the day of the week. This wheel has eighty-four teeth, and has a moveable circle on it with the days of the week repeated or doubled. The key may be used without a watch by merely turning the key six revolutions.

[Printed, 5*d*. See Rolls Chapel Reports, 6th Report, p. 153.]

A.D. 1764, November 29.—N° 819.

KEHLHOFF, Friederieck.—An ordinary spring so works on a snail that when the mainspring is in the greatest power this spring pushes fast upon the snail, and diminishes the force of the main-spring, and as the main-spring begins to be weaker the said spring pushes less, and so the force is at all times equal. The fourth wheel is in the center, and carries the second hand. On a pinion on its arbor is fixed one end of a little spring of the strength of a pendulum spring; the other end is fixed on the arbor of the fourth wheel. "This little spring makes the watch " go, because the power of the main-spring goes no farther than " to wind up that little spring, and is the great spring. If the " second or third wheels take in a little too deep or not deep " enough, it cannot cause an unequal pit, because" this little spring is always wound up. All the wheels are horizontal. The balance wheel has two circles, in which are pins which form the teeth. The balance has a straight arbor. The working part is of a triangular figure, and goes in the middle of the two circles of this balance. The pallets work under the pivot of the balance.

[Printed, 5*d*. See Rolls Chapel Reports, 6th Report. p. 133.]

A.D. 1766, January 7.—N° 836.

HAYWOOD, Peter.—A lunar or calendar ring consisting on the outside of four circles, one of which is fixed, and is divided into thirty parts, each part containing one of the letters of the days of the week in each month. Two moveable circles slide round this, one on either side, divided similarly, and having the numbers one to thirty round them; signifying in one the days of the month, in the other the moon's age. The fourth ring slides round a groove in the side of the last ring, and is divided into twenty-four parts, having the numbers I to XII and I to XII again round it. This is to show the time of high water. This is set on change of place, the other moveable ones once in four weeks.

A ring may be made in the form of a cluster ring, one circle being fixed and another sliding round the inside of it. The figures and letters are seen through a transparent stone, fixed in the setting.

A third ring has the fixed letters at the side of the transparent stone, and the moveable circle inside the hoop of the ring.

[Printed, 6*d.*]

A.D. 1769, December 13.—N° 946.

FREEMAN, James.—The invention is for "A central stop "watch, vertical or horizontal, without the assistance of a "compound motion." In the vertical watch are the barrel and spring, the great wheel and fusee, the second, third, and contrate wheels, and the balance and verge; in the horizontal there is the addition of the "horziontal wheel."

[Printed, 5*d.*]

A.D. 1770, July 21.—N° 965.

HARRIS, Thomas.—"The middle of the dial of the watch, "being with any thought painted, will point the time, because it "goes round. The middle may be a standard, and the figures "go round." This watch can be made, with the day of the month at one time, to show the age and change of the moon, or the time of high water.

"The pendulum may be applyed many ways, or used in "conjunction with the leaver to augment force or power, to "quench fires, to drain land or ships and to all sorts of grinding "and craneing."

[Printed, 3*d.* See Rolls Chapel Reports, 6th Report, p. 137.]

A.D. 1771, May 2.—987.

NORTON, Eardley.—"A clock which strikes the hours and "parts upon a principle entirely new; and a watch which repeats "the hours and parts, so concisely contrived and disposed as to "admit of being conveniently contained not only in a watch but "also in its appendage, such as a key, seal, or trinket."

[Printed, 9*d.*]

A.D. 1772, July 31.—N° 1021.

WEBSTER, Robert.—A repeater, the action of which is as follows;—the rack and striking piece move concentrically on the bridge which is over the hour wheel. On the hour rack are twelve steel teeth to work the upper hammer tail; contrate teeth for the pinion at the pendant to work in; the fixed hour rack tail; the quarter lifting rack; and a spiral spring the other end of which is fastened to a stud on the bridge. The pendant pinion being pushed with the thumb, frees itself from the contrate teeth, and the spiral spring throws back the rack and striking piece till the fixed rack tail comes in contact with the moveable hour rack tail on the upper pillar plate, and drives it to the hour snail; while at the same time the quarter rack is carried by its spring to the quarter snail. By then turning the pendant pinion by the milled head of the pendant, the said twelve teeth work the upper hammer tail, and strike the hour, and the hour being repeated, the lifting part in the rack and striking piece then comes into operation and strikes the quarters.

[Printed, *6d.* See Rolls Chapel Reports, 6th Report, p. 161.]

A.D. 1773, July 22.—N° 1048.

SMALL, WILLIAM.—A method of constructing timepieces, "the " simplicity of which depends upon employing sectors or racks, or " levers, instead of wheels, scapements instead of pinions, " roughened circumferences instead of teeth, fixed studs or pins " instead of axes, circles with Vernier's Divisions instead of hands, " and occasionally centrifugal hydraulic machines instead of " ballances." The pendulum is mounted upon an axis, the extremities of which are cylindrical, and rollen surfaces so curved that the vibrations are nearly isochronal: the number of wheels and pinions is lessened by substituting sectors or levers for the former, and scapements for the latter. The scapements are fixed to the sectors or levers, and deriving a reciprocal motion from teeth or pins in other wheels or sectors, or in bars or pieces of other forms, communicate reciprocal motion to the sectors. In some cases the scapement is moved only in one direction by the clock, and is returned back by its own weight, or by a spring. or slow or irregular motions, or unequal or large portions of time, roughened circumferences of wheels, or sectors, are used. Instead of hands, revolving circular plates, with Vernier's, or Nonius's divisions, are used.

[Printed, *3d.*]

A.D. 1775, December 30.—N° 1113.

ARNOLD, John.—"A new pendulum spring for timekeepers, " and the method of compensating the effect of heat and cold of " the same." A helical or cylindrical spiral spring, made by winding a straight lamina of steel round a cylinder, on which it is hardened and tempered, is fastened to the balance vertically. The compensation is in the balance, and on the under side is affixed a spiral, composed of two metals, brass and steel, the inner end of which is screwed to the collet of the verges; the other end has a small hole into which the pivot of a lever is inserted. Two segments of circles are combined with this lever, by means of arms, and made to approach the centre of the balance in hot weather, and recede from it in cold, by the expansion and contraction of the said spiral.

[Printed, 5*d*. See Rolls Chapel Reports, 6th Report, p. 163.]

A.D. 1780, March 18.—N° 1249.

RECORDON, Louis.—A watch which winds itself up. A weight of silver is so placed inside the watch, as to be in equilibrium when in a horizontal position, being sustained by a pivot, on which one end works, and by a spiral spring. The motion of walking disturbs the equilibrium, and the weight is thrown up by the spring against a spring placed above the weight, which latter spring causes the weight to descend again, and the motion thus continues. The weight by this process, acts, by means of wheels, on the barrel, and thus winds up the spring of the watch. A little mechanism prevents the watch being overwound, and also throws off the operation of the renovating part when the watch hangs up at rest.

[Printed, 9*d*.]

A.D. 1782, January 1.—N° 1311.

TYRER, Thomas.—" Horizontal scapement for a watch to act " with two wheels, being a new and very great improvement on " horizontal watches."

[No Specification enrolled.]

A.D. 1782, April 15.—N° 1324.

MORLEY, Hildebrand.—A machine to give to mills, clocks, &c. a constant motion. Consists of a large wheel having divisions on its rim, like a water wheel, each large enough to contain a round wooden or hollow metal ball. This is connected by pullies with a smaller wheel, which drives a third wheel, to which are attached lifters. As the large wheel revolves, thereby causing the others to revolve, the balls fall off, and rolling down an inclined plane or spout, enter a tall square tube filled with quicksilver or some fluid, and, from their lightness, rise to the surface, and are lifted out by the lifters, and then roll down another inclined plane or spout, and reload the large wheel. There is also a small wheel attached by spokes to the rim of the large wheel, and thus kept in motion. The machinery is fixed to a framework.

[Printed, 3*d.*]

A.D. 1782, April 15.—N° 1325.

MORLEY, Hildebrand.—Somewhat similar in character to the last. A string, with one of the balls at one end, and a small weight at the other, passes over a pulley, attached to a dial, whereon the twelve hours are unequally marked, and turning on the same axis as the hour hand. The ball floats on the surface of water in a tube. There is a small hole in the tube, through which the fluid flows gradually, unequally, and slowly, and as the ball sinks the pulley turns round, and the hand points to the hour.

The pulley and dial may be dispensed with, by having a belt with the hours and subdivisions marked on it, stretched out alongside the tube, which is made of glass. As the fluid sinks it shows the hour on the belt.

[Printed, 3*d.*]

A.D. 1782, May 2.—N° 1328.

ARNOLD, John.—The tooth of the balance wheel is an epicycloid; the part of action in the pallet on which it acts, is a straight line from the outer edge to the center of the verge. The scape wheel rests on a single spring, whilst the balance is vibrating, until it is unlocked to add new impulse to the balance. The ends of the helical spring are incurvated, to render the expansion and contraction of the spring perfectly concentric with the center of the balance or verge. The balance is adjusted by two pieces of compound metal, placed in particular ways, for compensating the effects of heat and cold.

[Printed, 5*d*. See Rolls Chapel Reports, 6th Report, p. 141.]

A.D. 1782, November 15.—N° 1342.

MORLEY, HILDEBRAND.—A timepiece whereby the time is shown by the fall of sand, from the head of the timepiece, through a very small hole, into a chamber, in which is a peculiar valve, through which the sand passes, and falls into a tube having a glass side or front, and having a band stretched alongside, with figures properly marked thereon, to show the hours and quarters. The air is allowed to escape from the tube into the head by a pipe. The valve is made with either a single or double fall; and the sand passes through as soon as there is sufficient in weight on the single fall to overbalance the resistance of a small weight, and in the case of the double fall, when the weight on one fall overbalances the other. A similar timepiece acts by means of mercury instead of sand.

[Printed, 9*d*.]

A.D. 1783, February 1.—N° 1354.

WRIGHT, THOMAS.—This invention relates first to the application of horizontal bars, the upper side of which is of steel or iron, and the lower side of copper, zinc, and silver or brass compounded with other metals, so as to have the property of expanding more than the upper side; which bars are used either alone, or in conjunction with other bars, in which the more expansive metals are uppermost, for the purpose of causing the pendulum ball to be raised, in proportion as the pendulum spring is lengthened by expansion, (or vice versâ), the pendulum being fastened to the bar or bars in various ways.

2. The application of the same metals to the rims of the balance; the rims being divided in certain places, and being heaviest nearest to such divisions, so that, as the outside of the balance are the most expansive, the free extremities of the rim are forced nearer

the centre of the balance, and thus counteract the effect of the expansion.

3. A pendulum escapement;—the hook of the detent lever acts on pins placed on the balance wheel, and the hook is discharged by a pallet falling on it; which pallet is fixed to an arm attached to the verge staff, and then motion is given to the pendulum, by the tooth of the escape wheel falling on the pallet, which it does immediately after it is disengaged from the detent lever.

4. A scapement where the locking spring is bent up by a pin on the verge, and the tooth of the escape wheel released. On the return of the balance this pin presses on the contrary side of the spring, and the wheel continues locked.

[Printed, 9*d*. See Rolls Chapel Reports, 6th Report, p. 167.]

A.D. 1783, June 17.—N° 1377.

FISCHER, John.—A geometrical and pedometrical watch. The machinery may be introduced into any watch, except a repeater, and is wholly unconnected with the works. The dial has, besides the usual one, three specific circles of figures. The outside one has 100 divisions, the second has 10, and the third has 20. The first marks every step up to 100, the second every 100 up to 1,000, and the third every 1,000 up to 20,000. The machinery works by means of a pusher through the pendant, like a repeater, the pusher being connected to the dress by a string, which is kept at a proper stretch, by a little instrument, containing a common barrel with a watch spring inside. The motion of the leg in walking operates on the pusher, so as to turn a snail of 10 teeth one tooth every step, the pinion of which pitches into the center wheel of 100 teeth, which, by means of the great hand, marks every step on the large circle. When the great hand has gone round once, it moves another snail of 10 teeth one tooth, which is shewn by the hand of the second circle, and when this hand has gone round once, it moves a snail of 20 teeth one tooth, which is shewn by the hand of the third circle. When this last hand has completed its round, 20,000 steps will have been marked.

By additional wheels, 100,000 steps may be marked on the outside circle; a small circle shewing every step up to 10, another every 10 up to 100, a third every 100 up to 1,000, while the outside circle marks every 1,000 up to 100,000. Indeed, by the aid of wheels and levers numberless alterations in the number may be made.

It is of importance that the watch fits close in the pocket.

[Printed, 6*d.*]

A.D. 1785, August 5.—N° 1495.

CHATER, JAMES.—Watch and note guard. The guard is fastened to the watch by a shank, and the mechanism is as follows. A tongue is made to act on a joint, near the lower part of the guard, nearest the watch. By pressing a small stud at one side of the guard, the upper end of the tongue flies out, in consequence of a bolt, by which the tongue had been held down, being withdrawn, and the tongue being then acted upon by a spiral spring inside the guard. The tongue remains standing out at an acute angle until the stud is placed in its former position. Across the inside of the pocket is sewn a spring, behind which the tongue, if the watch is attempted to be withdrawn, slides, and the watch is thus held fast. The invention may be applied to the hook which connects a lady's watch to the chain, or to a note case, which should be made curved to fit the thigh.

[Printed, 1*s.* 1*d.*]

A.D. 1788, May 20.—N° 1650.

WHITE, JAMES.—The part of this invention which relates to clocks is the following. In common striking clocks the descent of the weight is checked by a train of wheels and an air fly, instead of which the patentee uses a vibrating body; that is to say, he regulates the strokes on the bell by means of a pendulum or balance of any shape, which he causes to vibrate in various ways. He attaches the hammer which strikes the bell to the vibrating body, on its center of motion. The number of strokes he regulates in various ways, not confining himself to any in particular.

[Printed, 11*d.* See Rolls Chapel Reports, 6th Report, p. 179.]

A.D. 1789, November 6.—N° 1708.

HARLOW, SAMUEL BOULTON.—The application of a friction joint over the spout of a watch key, so as to prevent damage when the key be turned the wrong way. Immediately below the friction joint is fixed a flat horizontal plate, to the under part of which one end of a curved spring is fastened, and at the other end of which is a click or catch which rises through the upper surface of the plate. The click is sloped or bevilled at one side, so as to form no obstacle when the fly is turned the wrong way, and is square or upright on the other side, so that, when the key is turned the right way, the resistance of this side gives motion to the spout.

[Printed, 3*d*. See Rolls Chapel Reports, 6th Report, p. 180.]

A.D. 1791, August 13.—N° 1823.

MACKENZIE, Colin.—A new link for a chain. At each end of a piece of metal, (or other substance such as hemp or leather,) is made an eye or hole. The metal is then bent into an oval, or other shape, to form a link. To unite the links to form a chain, pass each one through the eyes of the preceding one.

[Printed, 3*d*. See Rolls Chapel Reports, 6th Report, p. 184.]

A.D. 1794, October 14.—N° 1830.

LITHERLAND, Peter.—An escapement. The rack acts on the pinion on which the balance is rivetted. The pallets on which the pallet wheel acts, may be across, or at the side of the lever. The lever "gives power to the balance to react upon the wheel- "work, by which the balance acts from its own nature." The rack may also be applied for the purpose of winding up watches or clocks without a key.

[Printed, 6*d*.]

A.D. 1792, June 12.—N° 1889.

LITHERLAND, Peter.—1. Improvements in escapements, by which watches are made to beat once only in a second, and also to point dead seconds.

2. An instrument to counteract the effect of heat and cold. A steel bar is fixed on the same center as that on which the regulating spring acts. There is a convex brass spring to this bar, with a notch in it near the middle, so that when it expands it produces a greater curvature and lays hold of different parts of the regulating spring; and vice versâ.

3. Winding up watches, &c., without a key, by means of an external lever connected by mechanism with the barrel arbor.

[Printed, 9*d*.]

A.D. 1793, March 15.—N° 1936.

COLE, RICHARD.—1. An escapement, for beating, striking, and pointing seconds or parts of seconds. May be either vertical or horizontal. The vertical wheel has fifteen teeth, and goes round twice in a minute. It acts on the verge, on which is fastened the pendulum spring and the verge wheel having ninety-six teeth; twenty-four of which, acting in a pinion of six teeth, turn the balance four times round every beat. In the horizontal escapement the horizontal wheel of fifteen teeth acts in a cylinder to which is fastened the regulating spring and the cylinder wheel of ninety-six teeth, which cylinder wheel acts as the verge wheel mentioned above. In both the number of teeth in the wheels and pinion may be varied according to the number of beats required in one minute.

[Printed, 6*d*.]

A.D. 1793, December 13.—No. 1970.

LESLIE, ROBERT.—Relates to the following:—1. A short pendulum to vibrate seconds. Two weights are connected by a bar, and the bar suspended by two springs, the upper ends of which pass through a bar screwed to the back plate of the clock. The clock is regulated by these springs being moved nearer or farther apart by means of a screw. Instead of the weights and bar, a wheel is sometimes put.

2. A rolling pendulum, consisting of a piece of metal of any diameter, having turned round it two small grooves, which receive two parallel springs supported by a frame. The clock is regulated by the tightening or slackening of these springs.

3. A regulator for clocks which has the properties of the "gridiron pendulum." A brass wheel has a groove round it which receives a watch spring, one end of which is fastened to the wheel, and the other, after one or more turns round the wheel, as the length of the pendulum requires, passes down to the rod. One edge of the wheel is left high enough for teeth for the regulating screw to act in.

4. A scapement. The motion is given to the pendulum by two springs, each having one end fastened to a roller, and the other to one of the pallets. The wheel acts on these and raises them alternately.

5. A scapement. A lever is pressed against the scape wheel by a spring, which, by a pin, also prevents the wheel running. On the arbor of the balance is a pallet which receives the impulse from the prong of the said lever. The lever is held up by a spring, until a small pin on the said pallet disengages it; the lever then falls through the influence of the first-mentioned spring, strikes the pallet with its prong, and then with its long arm releases the pin which prevents the scape wheel from running. A tooth is thus allowed to escape, when the lever is brought back into position ready for a similar motion.

6. The striking part. On the great wheel is a plate with notches to determine the number of strokes in the common way. The hammer is raised by pins on a star wheel, by whose points acting on the balance arbor the balance is regulated. The hammer makes one stroke every second vibration, and when all are struck, the whole is stopped by one end of a lever falling into one of the notches, and the other against a pin on the rim of the balance.

7. A method of determining the number of strokes in repeating clocks. A wheel with seventy-two teeth, having on its side a pin at every twelve teeth, is moved one tooth every hour. A click on the rack stops against these pins. The regulator of the striking is a hollow box made like a spring barrel, and put on the arbor of the pinion which moves the rack; the box has a division from its centre to near its rim on one side, and there is a quantity of sand put in, which has to pass every revolution through an aperture: the velocity is determined by the quantity of sand, or the size of the aperture.

8. A nautical clock with two dials; one to shew the time "at the place sail'd from, and the other the time of the present "place."

9. A method of giving motion to a balance without friction. A lever is fastened to one end of the cylinder: one end turns up, and passes through a hole in the upper frame plate; this end has a hole to receive the balance spring at the distance of about one turn from its outward end; the inward end of the balance spring is fastened to a collet on the arbor of the balance, while the outward end is fastened to a stud in the plate. By giving motion to the cylinder, and the lever on it, and thus moving the spring, motion is given to the balance.

10. The repeating part. The stroke is regulated by a balance instead of the train of wheels in other watches. To make the watch repeat, the rack is pushed down by the pendant, and is urged back by a spring which has power equal to the main spring in other watches. As the rack returns it acts on the hammer tail to draw the hammer in, and is prevented from doing it too quickly by a small spring which acts on the arbor of the balance as a scapement, which turns the balance till it passes through a small notch in the arbor; the rack then slips off the hammer tail, but is prevented from flying all the way back by a spring, which the stroke of the hammer disengages, and the rack again falls on the hammer for another operation. When the hour is struck, a pin in the end of the hour rack takes hold of the quarter rack, to strike the quarters. The sound of the quarters being struck is made to differ from that of the hours.

11. A mainspring for clocks, watches, or timekeepers of any kind. The spring, which may be a square bar of requisite thickness, is bent round the movement outside the pillars, and between the frame plates. Where the two ends meet, they press against a stud fastened to one or both of the plates. The middle of the spring is cut in a peculiar form, and is acted on by a piece, fixed on the rack, "on the principle of the spring and tumbler of "a gun lock."

12. A method of winding up a watch by the pendant. On the square where the key should go is a ratch; the pendant, being alternately moved in and out, turns this ratch by means of two clicks on either end of a fork fastened to the pendant.

[Printed, 1*s*. 3*d*. See Repertory of Arts, vol. 2, p. 92.]

A.D. 1796, August 17.—N° 2132.

HALEY, Charles.—A helical renovating spring with certain apparatus, placed between the balance wheel and balance, which is wound up 150 times in a minute. The renovating spring is so placed that its axis, the axis of the balance, and the balance wheel, have their centres all in the same right line. On the axis of the renovating spring is a round pallet, in a notch on the edge of which the teeth of the balance wheel act, and thus wind up the renovating spring. The renovator is prevented from unwinding by a spring (which is so made that the discharging pallet on the axis of the balance will pass by when going one way, but when returning will not do so), catching behind what the patentee calls the "snail pallet," which snail pallet is just above the round pallet, and, as well as its former purpose, serves the purpose of locking the next tooth of the balance wheel. On the axis of the renovator is "the impelling pallet" to give impulse to the balance by striking on a pallet on the axis of the balance. Suppose the discharging pallet to have passed the detent spring; the balance on returning removes this spring, thereby releasing the snail pallet and consequently the renovator; the impelling pallet flies round and gives the impulse to the balance, and immediately after the snail pallet unlocks the balance wheel, the next tooth of which again winds up the renovator by acting on the round pallet, the detent spring prevents it from being unwound until the discharging pallet of the balance has passed by on its return, when a similar operation takes place. The spring may be a spiral having all its coils in the same plane, or in the surface of a cone or cylinder. The patentee does not confine himself to any particular number of beats per hour.

[Printed, 11*d*. See Repertory of Arts, vol. 6, p. 145; and Smith's Mechanics, vol. 1, p. 496.]

A.D. 1796, November 24.—N° 2148.

TRUSTED, Charles.—A timepeater to strike the hours and quarters. The hour barrel is a barrel with a wheel fixed to it, on which are twelve pins to strike the hours, and on the cylinder part of the barrel are twelve pins diagonally placed in two arrangements, to stop against a stud fixed in the sliding rack; this stud governs the number of strokes. To tell the hour of the night, a brass wheel with a corded edge, which is screwed upon the end of the barrel arbor, must be turned backward until the stud stops against such of the pins as corresponds with the hour, and then must be turned gently forward, and the hammer will strike the proper hour upon the bell. The aforesaid sliding rack has 24 teeth, and is worked by a pinion of 10 teeth in modern or flat watches, and of 8 teeth in old watches, where 6 turns of the fusee are required. On the outside of the rack are 12 divisions for the 12 hours. To set the machine in the evening, the graduated divisions of the rack must be set to correspond with the hour.

When there is a quarter barrel, the hour barrel must be made longer. After the last stroke of the hour is struck, the hour barrel communicates the acting force to the quarter barrel by pins acting against each other. The quarter barrel is very similar to the hour barrel; the pinion and rack being respectively of 20 and 48 teeth in modern or flat, and of 16 and 48 teeth in old watches.

[Printed, 7*d.*]

A.D. 1798, December 17.—N° 2280.

PECKHAM, John Randall.—A mariner's compass is inserted in or upon the face of the dial. To prevent the works of the watch and the magnetic needle affecting each other, all the works usually made of steel, and for which steel is not absolutely necessary, are made of gold, silver, or any other metal or admixture of metals which have no influence on the magnetic needle.

[Printed, 3*d.* See Rolls Chapel Reports, 6th Report, p. 147.]

A.D. 1799, November 4.—N° 2351.

GOUT, Ralph.—The title of this invention is as follows: " Certain new improvements or pedometers and pedometrical " watches, for the purpose of ascertaining more accurately, and " with greater precision, the number of steps the wearer makes in " walking, and, when affixed to a saddle, the number of paces " the horse makes; and also, when affixed to a curricle or other " carriage, the number of the revolutions of the wheel." 1. The first sort is placed in the fob, and is acted on in the usual way by a pusher.

2. A pedometer of any sort is fixed to the saddle, and is acted on by a small machine fixed to it; at the bottom of which is a crank to which an elastic martingale is attached. Every step of the horse pulls the crank, which acts on one end of a lever inside the machine, and thus the pedometer receives its impulse. The lever is recalled to its place again by a small spiral spring.

3. In a carriage, the pedometer is fixed in machinery similar to that for a saddle, save that the crank is omitted. The machinery is screwed on the axletree, and the pedometer receives its impulse by a tooth on the nave of the wheel acting on a tooth which is

placed on an arbor inside the machine, and thus marking the revolution.

[Printed, 7*d*. See Repertory of Arts, vol. 13, p. 73.]

A.D. 1801, February 17.—Nº 2482.

BENNOCH, John.—The title of the invention is, "New and "expeditious methods or machines for making nails, bolts, rods, "watch springs, clock springs, and metal plates." The machine seems to be principally for the manufacture of nails.

[Printed, 11*d*. See Rolls Chapel Reports, 6th Report, p. 200.]

A.D. 1803, April 20.—Nº 2700.

DAY, Samuel.—A watchman's telltale or timekeeper. A horizontal wheel has on its upper surface a dial showing the hours, and round its edge or side are also marked the hours. The part of the surface outside the surface dial is divided into cells, each cell corresponding with a quarter of an hour, or, if the number be increased, with every five minutes. By means of a smaller wheel and pinion the large wheel is set in motion by ordinary clock work placed below, and is made to go round once in 12 hours. As it moves round, it carries the cells under a chink, which sinks down from a box above the wheel. The whole machine is placed in a locked up case. There is, however, a small door which will open to give access to the chink. The instrument may be used for a variety of purposes, such as the following:—A watchman, at the end of every beat, may be obliged to drop a numbered token down the chink. It falls into one of the cells, and marks the exact time when it was dropped in.

Under the aforesaid box is an aperture to show the hours marked on the side of the wheel, and below that is a minute dial. These can be seen by opening the aforesaid door.

[Printed, 7*d*. See Repertory of Arts, vol. 3 (*second series*), p. 161.]

A.D. 1803, May 28.—Nº 2706.

GOULD, Chester.—"A glass on a new principle to be used by "mariners at sea, instead of the common sand glasses, when "heaving the log." A hollow glass globe, about the size and shape of an orange, or egg, with a hole at each end, the holes being of such sizes respectively that the glass, being filled with water, will empty itself at one end in half a minute, at the other in 15 seconds. The aforesaid size, shape, or time, may be varied.

[Printed, 3*d*. See Repertory of Arts, vol. 3 (*second series*), p. 243; and Rolls Chapel Reports, 6th Report, p. 152.]

A.D. 1804, May 14.—N° 2759.

ELLIOT, Joseph Moseley.—" Repeaters upon a new and " improved principle, so as to repeat the hours, quarters, half- " quarters, or every five minutes, the hours first, and then the " divisions thereof, or the divisions of the hour and then the hour, " by turning the pendant either to the right or left, with one " hammer only, and which may be made either bell or dumb " repeaters." By moving the pendant to the right, a small pallet acts in a rack, and causes a lever inside the watch to turn on its axis until one of two arms rests against the hour snail and is stopped, the hammer meanwhile being acted on by means of the hour rack. By moving the pendant the contrary way, a similar action takes place with regard to the quarter snail. Either operation may be done first, and as soon as one is performed the lever is brought back again by a spring barrel.

[Printed, 5*d*. See Rolls Chapel Reports, 6th Report, p. 153.]

A.D. 1805, March 26.—N° 2834.

BOND, George Alexander.—The dial plate is made of some transparent substance, and a light is placed behind, so that, the figures on the dial and the hands of the clock or timepiece not being transparent, the time can be seen in a dark room. In order that the mechanical part of the clock may not intercept the light, the dial plate may be advanced, and the light placed between it and the part which contains the works; or such part may be made small, and the dial large; or the movement part may be placed below, or on one side of the dial.

2. An improvement in enamelled dials, by making a plate of enamel by itself, of sufficient thickness to admit of polishing. This is fixed on a metal plate by cement, or by being set as in jewellery.

[Printed, 5*d*. See Repertory of Arts, vol. 7 (*second series*), p. 161; and Rolls Chapel Reports, 6th Report, p. 153.]

A.D. 1805, November 19.—N° 2893.

DE LAFONS, JOHN.—A marine alarum, which is a substitute for the half and quarter glasses used at sea. A wheel with ratchet teeth turns on an arbor, which passes through the plates, and carries a handle, and is propelled forward by the main spring. Connected with this arbor is a click which is held by the ratchet teeth of the said wheel. As the wheel revolves the click is discharged from the teeth, which gives liberty to the arbor to turn on its centre, and the handle affixed to it strikes a bell. This handle also strikes a nut, which causes a pump piece to move, and to drop a pin into the escape wheel, and the machine is thus stopped. The piece thus stopped will remain so, when the handle is turned to the quarter or half minute or other time, until the nut is pressed down, which discharges the pin out of the escape wheel, at the exact moment required. A spring bears against the pump piece to keep it in its place when either up or down. The said wheel, " when designed for nautical purposes, turns a pinion with " a crown or balance wheel, which acts in a common verge and " balance, with fans or flys to adjust it accurately to time." The patentee also makes his machines with a rack or portion of a wheel, which, when it has acted on the pinion, will drop off by the power of the main spring, and the rack itself, or any piece affixed thereto, strike the bell. The nautical machine may also be made with an escapement and discharge.

[Printed, 5*d*. See Repertory of Arts, vol. 9 (*second series*), p. 3.]

A.D. 1806, October 30.—N° 2983.

ELLIOT, JOSEPH MOSELEY.—" New improved method of " making and constructing repeaters or repeating watches and " timepieces." By this method watches and timepieces may be made to repeat, not only the hour and quarter, but also to the last minute, with one hammer only, without the usual train of wheelwork.

[Printed, 5*d*. See Rolls Chapel Reports, 7th Report, p. 103.]

A.D. 1807, December 5.—N° 3085.

MANTON, Joseph.—"An instrument or machine for timekeepers "to act in vacuum, so constructed that they may be wound up "in vacuum when required without admitting the external air."

[Printed, 3*d*. See Repertory of Arts, vol. 16 (*second series*), p. 327.]

A.D. 1808, January 26.—N° 3102.

SAVAGE, George.—A method of regulating the force or power of the mainspring, by the introduction of a minor spring, to be wound up by the main spring at certain periods. As the wheels revolve, some pins placed in a small circle in the hour wheel, force up a lever, which, by means of a pallet, unlocks a quarterpiece which covers the minor spring. This operation causes the main spring to wind up the minor spring, and administers an equal impelling power to move the train of wheels.

[Printed, 5*d*. See Repertory of Arts, vol. 12 (*second series*), p. 349.; and Rolls Chapel Reports, 7th Report, p. 105.]

A.D. 1808, April 27.—N° 3125.

MATHEW, Daniel Dering.—1. Two equal and similar wheels are so placed on the last arbor of the train, as to have the points of the teeth of one wheel to stand respectively in the middle of the intervals between the points of the teeth in the other wheel. The pallets which work against these teeth are on levers which terminate in separate axes or centers of motion, but the axes are so disposed as to cause the motion of the said levers to be concentric with each other, and with the balance. The pallets are urged towards the wheels by two back springs acting on the respective levers. A compensation for heat and cold may be applied to these, by any of the usual methods, instead of to the balance. The verge or axis of the balance is made in the form of a crank, the arm of which, when the balance wheel is made to vibrate, displaces the levers alternately, so that the pallets act in the teeth of the wheels; the motion continues, because the reaction of the springs is greater in the return of the balance to its former position, than in the other parts of the vibration.

Instead of two wheels, may be used one wheel, the teeth of which stand contrate.

2. Stopping the holes with platina, instead of using brass or jewellery in the movements.

[Printed, 6*d*. See Repertory of Acts, vol. 13 (*second series*), p. 73.]

A.D. 1808, August 24.—N° 3164.

CONGREVE, WILLIAM.—Detaching the time measurer from the first mover, for a greater duration of time.

1. The inventor takes as his time measurer "a perfectly detached "body descending freely down an inclined way." A tube is connected with the train by an arbor and pinion, and a ball runs down this tube, in consequence of its being inclined, from one end to the other; it then strikes a detent which held the tube in its then position, and the tube, being discharged, makes a half revolution, and is caught by the detent again. The ball is thus brought to the upper end again, and of course descends again. By varying the length and inclination of the tube, the ball can be made to make more or fewer descents in a minute. By having an inclined plane with grooves on it, the patentee carries his invention so far as to get an extension of detachment of the duration of a minute, or more. He also varies the principle by using two or more balls.

2. He accomplishes the same effect by a simple pendulum. A light spring wheel of 30 teeth is unconnected with anything but the seconds hand, and a pair of pallets. Another pallet, on the same stock, is connected with a large wheel of 60 teeth. On the face of this wheel are 60 pins, and a lever acting on these locks the wheel. On the face of the little wheel is one pin. A seconds pendulum being set in motion, the pallets drive the little wheel, and at the 60th second, the pin discharges the lever from the pins of the large wheel. This, being thus unlocked, starts forward from the action of the first mover, and one of its teeth striking the pallet of the large wheel, gives renewed motion to the pendulum. When the pin on the little wheel has passed the lever, the lever relocks the large wheel, for another 59 seconds.

[Printed, 11*d*. See Repertory of Arts, vol. 14 (*second series*), p. 1; and Rolls Chapel Reports, 7th Report, p. 107.]

A.D. 1808, October 31.—N° 3174.

BERROLLAS, JOSEPH ANTHONY.—"Infallible repeating watches." The outside is the same as in a common watch, save that the pendant is mounted with a button consisting of two parts; the lower part immoveable, the upper, having an endless screw annexed to it, moveable, so as to come out to the extent of four turns. Being turned to the right, it operates on the hour rack; being turned to the left to bring it back again, it operates on the quarter rack. Except that there is a hammer, the movement is the same as that of a common watch that is not a repeater, and thus the extra five wheels, five pinions, barrel and main spring, which repeaters usually have, are avoided. The motion consists of three principal parts; the hour rack, the quarter rack, and the endless screw.

[Printed, 5*d*. See Repertory of Arts, vol. 14 (*second series*), p. 364.]

A.D. 1808, December 20.—N° 3185.

SCHMIDT, JOHN.—1. " A Phantasmagoric Chronometer or " Nocturnal Dial." A vase or any case has on one side a watch with two dials, the outer one being the day, the inner one the night dial. The night dial is a concave reflector of highly polished metal, with the figures of the hours engraved reversely on it. On the side of the vase opposite to the night dial is a tube, in which are a combination of glasses or a single glass. In the foot of the vase is shut in a light. The works are between the dials, and the hour and minute wheels are of course double.

2. " The Mysterious Circulator or Chronological Equilibrium," which may be applied instead of the above, or may be used as a separate timepiece, or as an orrery. The work of any watch is fixed in a box representing the earth. A weight is fixed to the hour-hand wheel. The box and weight are fixed to one end of a lever, through which passes a steel centre or axis, and to the other end of the lever is a box with sufficient lead in to counterbalance in any position. The whole rests on a stand, on which is also supported the dial; the hours and minutes being shown by one hand only, or, instead, a nonius being applied to subdivide the minutes. To use this as a nocturnal dial, the reflector above described is fixed to the steel axis. To represent the increase,

decrease, and revolution of the moon, an apparatus is fixed to the back of the box containing the watchwork, in such a manner as to make what is taken to represent the moon invisible when between the sun and earth (the center piece being the sun and the box the earth), and then when turning round gradually to increase, showing the first quarter, &c. &c., on the proper day, for which reason the number of days in the month are engraved upon a brass circle fixed round the box.

[Printed, 6*d*. See Repertory o Arts, vol. 17 (*second series*), p. 9; and Rolls Chapel Reports, 7th Report, p. 202.]

A.D. 1810, May 26.—N° 3342.

BERROLLAS, Joseph Anthony.—" A warning watch on a
" new construction." The patentee says, " The inside of the
" movement is not different from a common watch, excepting a
" barrel, which is fixed with two screws on the under side of the
" top plate, as near to the mainspring as possible. The arbor of
" the side barrel is made in the same manner as a clock watch,
" has a brass wheel with sixty teeth, with a steel wheel fixed to it,
" which steel wheel has thirty-three teeth, cut like a ratchet, which
" cause the hammer to act. This hammer is placed between the
" main and warning barrels, and the side hammer strikes on a bell
" spring, which bell spring is fixed with two screws on the pillar
" plate. The spring in the warning barrell is wound up five times,
" which occasions the hammer to give one hundred and sixty-five
" knocks on the bell spring. Opposite the hammer is a pinion
" with six teeth, which act in the arbor wheel; this pinion is
" planted on one side of the upper plate, and on the other in a
" bar in the back of the pillar plate." On the side pinion is a wheel with forty-five teeth, which wheel acts in a pinion with six teeth, planted in the said bar on one side, and in the pillar plate on the other. On the said pinion is a wheel with twenty teeth, like a ratchet, which acts in a pallet. These form the warning parts, the said pallet being the one acted on by the detent of the warning.

[Printed, 5*d*. See Repertory of Arts, vol. 17 (*second series*), p. 257; and Rolls Chapel Reports, 7th Report, p. 110.]

A.D. 1811, September 9.—N° 3487.

CHANCELLOR, JOHN.—Musical instrument applicable to clocks. A solid piece of brass or bell metal is fixed in a case, the upper part of which is called the sounding board, by screws through the sides, so as to allow the said piece to move on the points of the screws as on an axis. The piece is so placed as to be nearly touching the sounding board. Bars of steel or bell metal are fastened, each by one end, to the piece, the bars (in preference made in an elliptical form) varying in length, breadth, and thickness, according to the intended note to be produced. The bars are struck by hammers, which are worked by the pinned cylinder or barrel of a clock.

Keys may be provided instead of the cylinder, so as to perform by hand.

[Printed, 6*d*. See Rolls Chapel Reports, 8th Report, p. 87.]

A.D. 1811, September 9.—N° 3488.

MARSH, THOMAS.—The patentee thus describes his invention:
" The wheel being first made of brass or steel, with a broad edge
" equally divided, and the upper edge to be cut with a common
" tooth; when so cut, to have one or more teeth taken out for the
" pinion to vibrate free in every given distance; the train proposed
" requires the other set of teeth sloped off to a point, suitable to
" lock on a pallet or pass through the notch of a roller."

[Printed, 3*d*. See Repertory of Arts, vol. 21 (*second series*), p. 9; and Rolls Chapel Reports, 8th Report, p. 88.]

A.D. 1812, April 30.—N° 3559.

MASSEY, EDWARD.—Consists in making timepieces so as to show the time vertically while the pallet wheel, pallets, and balance move horizontally; and in reducing the friction on the verge pallets, by the balance having about seven-eighths of its weight suspended by a thread, or by the thread passing over a pulley, and a weight being attached to the other end.

[Printed, 6*d*. See Repertory of Arts, vol. 32 (*second series*), p. 136; and Rolls Chapel Reports, 8th Report, p. 92.]

A.D. 1812, July 16.—N° 3584.

TOBIAS, Morris.—Binnacle time piece. Invention consists in "so calculating the train of the movement and motion, and so "contriving, graduating, and numbering the dial, as to divide "time in the same manner as seamen and mariners usually do at "sea by means of a half hour sand glass and bell, for the purpose "of regulating their several watches on deck." The dial has three circles; one divided into 30 equal parts answering to minutes; another divided into 24 equal parts, answering to half hours or bells, and numbered 1 to 8 three times; and the third divided into 12 equal parts answering to hours, and numbered II., IV., VI., VIII., X., XII. Two indices serve for these three circles. A larger sort may be made with a third index, to show the seconds.

[Printed, 6*d.* See Rolls Chapel Reports, 8th Report, p. 93.]

A.D. 1812, December 9.—N° 3620.

SMITH, Samuel.—"The escapement wheel, which is made of "brass, steel, or other metal, having five teeth, more or less, "strikes vertically upon pallets made of brass, steel, or other "metal, stones or not, with ruby or other stone, in a horizontal "position, on whose arbor is affixed a wheel to drive a pinion in "the balance, to which balance is affixed the pendulum spring to "render the motion at once steady and secure; the train of the "movement may be made to show seconds or parts of seconds at "the pleasure of the manufacturer or wearer."

[Printed, 3*d.* See Repertory of Arts, vol. 22 (*second series*), p. 202.]

A.D. 1813, March 13.—N° 3663.

RENTZSCH, Sigismund.—Hydrostatical or pneumatical chronometer. "It consists of a hollow glass ring, about four inches "diameter, which revolves on an axis, and contains mercury and "air, or any other fluids of different gravities, hermetically "enclosed; the heaviest will occupy the lowest part. In the "upper part, which contains the light fluid, there is a partition, "with a small perforation through it, made of glass, or any other "material that has no affinity with the enclosed fluids. The "moving power is a weight attached to the axle by means of a

" cord, which produces a circular motion at the same rate that the " light fluid is forced through the aperture in the partition by the " pressure of the heavy fluid, which, by the force of gravity, " endeavours to ascend in the same situation it held before the " application of the weight. The time is indicated by a graduated " circle on the glass ring and a fixed index."

[Printed, 3*d*. See Rolls Chapel Reports, 8th Report, p. 96.]

A.D. 1813, August 9.—N° 3732.

WESTFIELD, Robert.—Improvements in the horizontal escapement, by making the stems of the horizontal wheel of different altitudes, so that the teeth of the wheel in its revolutions act upon different parts of the pallets of the cylinder, and the diversity of action may be increased to the number of teeth contained in the wheel.

[Printed, 5*d*. See Rolls Chapel Reports, 8th Report, p. 96.]

A.D. 1814, November 17.—N° 3854.

MASSEY, Edward.—1. Relates to escapements, the principal feature of which is a lever with equal arms which is on the same axle as a wheel, which is connected by certain wheelwork with the swing wheel. The principle is varied, and the specification contains descriptions of escapements for pendulum regulators, marine box chronometers, and of detached escapements, and cylinder escapements.

2. Winding up fusee or other watches by means of the pendant. The pendant being pushed in, pushes in a small pin, which causes, by simple mechanism, a rack to move forward a certain distance, and thus partially wind the watch up, by the aid of a ratchet on the fusee axle, or going barrel, as the case may be. On withdrawing the pressure from the pendant, a spring returns the rack to its former place ready for a further winding up, and so on till the watch is wound up, a click preventing any unwinding.

3. Relates to compensation curbs of different constructions, the curbs being made with delicate springs at the end to press the curb against the compensation piece, and thus keep them in contact with each other.

4. Relates to a method for telling the day of the month, consisting in having the case of the watch divided from the centre

into seven equal parts, on which are engraved the days of the month from 1 to 31, and having a moveable circle with the letters of the days of the week on it; the moveable circle must be set every month. Similarly the moon's age may be shown.

[Printed, 11*d*. See Rolls Chapel Reports, 8th Report, p. 109.]

A.D. 1817, February 1.—N° 4097.

WALL, William.—The vibrations are performed with two escape wheels, one fixed on the fourth wheel arbor, the other on the fifth wheel arbor, and which are supported in opposite revolutions by the fourth and fifth wheels acting on the said arbors, thus conducting the escape wheels through their actions on the pallets or cylinder, formed in the rib or staff of the balance.

[Printed, 3*d*. See Rolls Chapel Reports, 8th Report, p. 116.]

A.D. 1817, February 20.—N° 4103.

LITHERLAND, Richard.—Escapements. 1. When the balance is at rest, the detent locks the pallet wheel. When the balance moves one way, the lifting pallet, or lifting pin, strikes the detent pallet, (with or without a slender spring), and forces the detent deeper behind the tooth of the pallet wheel, but does not unlock it. As soon as the lifting pallet or pin has passed the detent pallet, a spring, acting on the directing pallet which is on the same pivot as the detent pallet, brings the latter into its former position. As the balance returns, the lifting pallet or pin strikes the detent pallet the other way, and unlocks a tooth of the pallet wheel.

2. For chronometers or marine time-keepers, instead of the directing pallet and detent pallet, the patentee contrives the detent pallet and the detent to be both fixed to a "straight elastic steel, "made fast at both ends vertically."

3. An elastic power or rod, composed of "limina of brass and "steel," to act on the balance spring to adjust the motion in heat and cold.

[Printed, 5*d*. See Rolls Chapel Reports, 8th Report, p. 120.]

A.D. 1817, May 22.—N° 4128.

HUNT, Seth.—An escapement, of which the only new part is the form of a lever, which is in the shape of two arms at right angles to each other, the long arm working on an arbor, about two thirds down the lever from the part nearest the escape wheel; the short arm having two teeth; one of which, when the balance is set in motion, keeps striking it so as to continue the motion, while the other is worked upon by the teeth of the escape wheel. When the balance is set in motion, the lever is, by means of a pallet, disengaged from a catch which confined it, and is pressed down by the power of a spring. It thus releases the escape wheel from a spring which confined it, and the tooth of the escape wheel acts as aforesaid on the last-mentioned tooth of the short arm, and brings the lever to its former position.

[Printed, 5*d*. See Rolls Chapel Reports, 8th Report, p. 119.]

A.D. 1818, January 29.—N° 4214.

PRIOR, GEORGE.—The invention consists of an additional wheel, and other apparatus. Its axis is connected and concentric with the pivot of the escape wheel, and the two wheels have the same number of teeth. Round the axis is coiled a spiral or helical spring, one end of which is attached to the axis, and the other to the renovator which is screwed on the pivot of the escape wheel. When this pivot is turned by the main spring, the renovator winds up the spiral spring, until one of the teeth of the escape wheel is stopped by the detent. When the balance is set in motion, the additional wheel, whose teeth impel the balance, being unlocked, removes a lifting piece which is connected with the detent of the escape wheel, and allows this to proceed forward another tooth, and the renovator winds up the spiral spring as before.

[Printed, 5*d*. See Repertory of Arts. vol. 34 (*second series*), p. 1; and Rolls Chapel Reports, 8th Report, p. 124.]

A.D. 1818, December 5.— N° 4317.

SEYFFERT, FREDERICK WILLIAM.—New arrangement and construction of the repeating motion, by which the inventor says,—" I am not only enabled to reduce the repeating motion, " as heretofore used, to more simplicity by saving the crinnelier " creinaillier with its chain and varrels and hour snail (limason), but " the rest of the work can be done with less trouble, and of course " less expence. My invention is applicable to repeating watches

" and repeating clocks, with or without running wheels, and to
" clocks and clock watches."

[Printed, 8*d*. See Rolls Chapel Reports, 8th Report, p. 128.]

A.D. 1820, May 19.—N° 4465.

MASSEY, EDWARD.—" Improvements in the construction of
" chronometers and packet watches."

[No Specification enrolled.]

A.D. 1820, October 20.—N° 4501.

PREST, THOMAS.—A brass wheel whose teeth have a double action, vertically and laterally, is moved by turning a pendant knob, and thus gives motion to a wheel fixed upon the square of the barrel arbor, thereby winding up the main spring.

[Printed, 5*d*. See London Journal (*Newton's*), Vol. 2, p. 173.]

A.D. 1821, January 27.—N° 4530.

COLE, JAMES FERGUSON.—The escapement is detached, the improvements consisting in the application of a safety pin to a detent with pivots, a locking plate to the balance axis, and the return or unlocking spring in a reversed position. The balance is in form a circular plate, flat on one side, and turned hollow on the opposite side to such a depth as will leave no more substance or thickness than is sufficient to firmly support the rim. The effect of heat and cold on this chronometer is compensated by a curb, which curb is actuated by a compensator, the motion of which in one direction increases and in the contrary direction diminishes the acting length of the balance spring.

The aforesaid curb and compensator are so connected with the balance cock and the apparatus for adjustment, that by turning with a key a tangent screw, the time-regulating piece, compensator, curbs, index, and other parts thereunto affixed, will be set in motion, and the acting length of the balance spring thereby varied.

[Printed, 7*d*. See London Journal (*Newton's*), Vol. 4, p. 63.]

A.D. 1821, January 27.—N° 4531.

ARNOLD, JOHN ROGER.—Expansion balance; consists of a straight expansion piece vibrating about its own center, the upper part being of brass, and melted on the lower part, which is steel. A weight is screwed on to each end, and these weights, being screwed nearer to or farther from the center, will alter the mean time, and cause the vibrations to be faster or slower. Two steel arms hang down at right angles from the straight piece, at equal distances from the center, and at the extremities of these are also screwed weights. If the balance gains in heat and loses in cold, the weights must be screwed upwards; if the contrary, downwards; or, if necessary, the weights must be reduced and increased respectively.

[Printed, 5*d*. See London Journal (*Newton's*), vol. 2, p. 173.]

A.D. 1822, February 9.—N° 4645.

FATTON, FREDERICK LOUIS.—An astronomical instrument. On the face of the instrument are three dials; one of which revolves, completing a revolution every minute, and is divided into periods of 5 seconds each; the other two are fixed, and their hands are made to go round once in every 10 minutes, and once in every 5 hours respectively. Inside the instrument is a plate, one end of which is moveable on an axis, and at the other end is placed a standard, to which is an arm, and at the extremity of this arm is a little thing like the nib of a pen, which contains a little ink or other colour, or holds a pencil. This arm is so raised by the said standard as to be above the revolving dial. By pressing a button on the outside, certain machinery consisting of lever, starwheel, springs, &c., is worked upon so as to cause the said nib to descend, and by an instantaneous motion, to strike the revolving dial and leave a mark or dot thereon. The machinery is immediately ready to perform another operation of the same sort.

On the axis of the wheel which turns the 10 minutes hand is a snail, which, as the wheel revolves, pushes the end of the said plate which carries the arm, so as to cause the nib to approach nearer and nearer to the centre of the revolving dial, as the 10 minutes hand accomplishes its revolution. By this means, although the revolving dial goes round once in a minute, it will show the marks or dots without confusion during 10 minutes. At the commencement of every 10 minutes, the nib is made just to overhang the circumference of the revolving dial, and at the expiration of the 10 minutes, the snail having been carried once round, the nib returns to the same place again. The instrument requires winding up every 5 hours.

[Printed, 8*d*. See Repertory of Arts, vol. 1 (*third series*), p. 1; and London Journal (*Newton's*), vol. 4, p. 296.]

A.D. 1822, September 27.—N° 4707.

FATTON, Frederick Louis.—Similar to the last, only applied to a common watch or chronometer.

[Printed, 7*d*. See London Journal (*Newton's*), vol. 5, p. 281.]

A.D. 1825, March 26.—N° 5136.

ULRICH, John Gottlieb.—An independent remontoir spring lever, which strikes a detached balance, and causes it to vibrate independently of the train. The parts of the above to which the patentee lays claim are,—" A mode of performing the two opera-" tions of returning the spring lever to its dent and of giving " tension to its spring by the two opposite motions of the alter-" nating pallets." This is done by a tooth of the escape wheel pressing against one of the pallets of the plate to which the spring is fixed. The plate turns, and a fixed lifting arm, which is inclined towards the spring, carries the spring with it to its dent. Another tooth then strikes the other pallet, and turns the plate back again; the lifting arm being carried with it, but the spring being left locked.

2. " Unlocking the train by a force independent of the balance." When the balance releases the lever, the latter starts forward, gives a new impulse to the balance, and then causes the locking pallet at the end of the train detent to be pushed from the tooth, and the escape wheel is thus allowed to proceed.

3. A guard spring attached to the plate by one end, the other end acting against the escape wheel. From this spring a bent arm extends, and when the spring escapes from the tooth of the wheel, the arm presses against the impulse detent, and prevents it from vibrating. Also to the side of the train detent is attached a swelling piece which so nearly fills a notch in the spring lever that the detent is prevented from moving, and thus any tripping is guarded against.

[Printed, 6*d*. See Repertory of Arts, vol. 2 (*third series*), p. 448; and London Journal (*Newton's*), vol. 13, p. 122.]

A.D. 1826, January 6.—N° 5314.

OGSTON, James, and BELL, James Thomas.—Consists,—

1. In applying to the usual trains of wheels used in pocket watches, two barrels instead of one, each containing a main spring.

2. In combining each of these with a ratchet wheel, by means of barrel arbors made with great accuracy, and these two being combined with a third ratchet wheel, by which means very flat watches are made.

[Printed, 6*d*. See Repertory of Arts, vol. 4 (*third series*), p. 60; and London Journal (*Newton's*), vol. 14, p. 309.]

A.D. 1827, April 28.—N° 5489.

BERROLLAS, Joseph Anthony.—"A detached alarum watch. The inventor lays claim:—1. To the detent, which is an oblong steel plate, spring tempered, and having a hole in its center, through which the canon pinion passes. A pin is so affixed to the detent as to slide along a plate fixed on the under side of the alarum wheel, and while doing so keep one end of the detent elevated. There is, however, a notch on the said plate into which the pin falls once in 12 hours.

2. To the elevator, which is a thin steel spring, screwed down at its thickest end, so that its other end is elevated.

3. To the propeller, which is a steel lever, having a circular head at one end, and working on a pivot at the other, and also having a projecting part which is formed into an inclined plane, which passes under the elevated end of the elevator.

4. To the locker, which is a cylindrical piece of steel, one end being smaller than the other, and projecting through a hole in the rim of the case, the larger end acting between two pins on the plate. A spring passes over the small part, serving to hold it down, and at the same time pressing against the propeller and pushing it inwards.

5. To the locking lever, which has two pins, one of which presses against an arm of steel on the arbor of the fly pinion, and prevents the alarum from running down; the other is worked on by the small end and is called the tail, and is for the purpose of discharging the alarum.

The action of the above machinery is as follows:—When the detent spring is elevated, it presses down the elevated end of the elevator, which in its turn presses on the inclined plane, and thus presses the circular head of the propeller outwards, and causes the small end of the locker to protrude from the case. When the pin of the detent falls into the notch aforesaid, the whole thing is released from pressure, and the tail of the lever discharges the alarum.

[Printed, 6*d*. See Repertory of Arts, vol. 5 (*third series*), p. 67; London Journal (*Newton's*), vol. 2 (*second series*), p. 84; Register of Arts and Sciences, vol. 1 (*new series*), p. 128; and Engineers' and Mechanics' Encyclopædia, vol. 1, p. 700.]

A.D. 1827, December 13.—N° 5586.

BERROLLAS, Joseph Anthony.—1. The barrel ratchet, with its click and spring, which keeps the maintaining power up, is put on the barrel arbor. A recoiling ratchet is attached to, and a recoiling spring placed in, the barrel pully. A chain is also fastened to the barrel pully, and the other end is passed through the pendant, and is fastened to the impendent. The chain is not longer than to produce one revolution of the pully. To wind up the watch, pull the impendent as far out as possible; the recoiling spring will carry it back again. The operation must be repeated until the main-spring is wound up. Similar mechanism may be applied to a fusee arbor.

2. A finger touch, being "a kind of cap with a milled edge; " the minute hand is fastened to it when the hands are to be " set."

3. The locker, described in N° 5489, is made to remain in the case when it formerly protruded, and vice versâ, by the fulcrum of the propeller being moved to the other side of the inclined plane. The locking spring is superseded, and a spring put on the propeller. The motion received by the tail of the locking spring is a straight and not a side motion as formerly.

[Printed, 6*d*. See Repertory of Arts, vol. 8 (*third series*), p. 1; London Journal (*Newton's*), vol. 4 (*second series*), p. 78; Mechanics' Magazine, vol. 9, p. 65; Register of Arts and Sciences, vol. 2 (*new series*), p. 4; and Engineers' and Mechanics' Encyclopædia, vol. 1, pp. 698 and 702.]

A.D. 1828, April 19.—N° 5639.

ULRICH, John Gottlieb.—This patent is for improvements to be considered as variations of the principles set forth in the specification of his former patent (N° 5136) for an improved remontier detached escapement, and additions to the same.

[Printed, 1*s.* 6*d.* See London Journal (*Newton's*), vol. 3 (*second series*), p. 88; and Rolls Chapel Reports, 7th Report, p. 127.]

A.D. 1829, September 23.—N° 5850.

WESTWOOD, Robert.—The wheels and pinions are so arranged as to act under the barrel; that is to say, between it and the dial plate, thereby admitting within the limits of a pocket watch of the usual size a maintaining power of sufficient strength, with one winding up, to keep up a vigorous motion in the balance for eight days, or more.

[Printed, 5*d.* See Repertory of Arts, vol. 10 (*third series*), p. 143; and London Journal (*Newton's*), vol 6 (*second series*), p. 268.]

A.D. 1829, September 23.—N° 5851.

BROWN, Isaac.—1. Mechanism by which a watch is wound up. The winder is a circular rim, with an internal ratchet corresponding to the teeth of the barrel ratchet. The winder is let into the bezel, which slides round in a groove in the case. To wind up the watch the winder must be turned from right to left. If the watch be a fuzee watch, the mechanism is slightly varied, and the winder will have to be turned from left to right. The winder may also be a winding rack to move on a pivot, and made to move backward and forward, but so as not to move the ratchet in the backward motion.

2. Mechanism connected with the going fuzee and its spring detent. The perpetual ratchet is in a circular sink or recess at the under side of the great wheel, and within this sink is a groove in which the going spring is, one end being fastened to the great wheel, and the other to the ratchet. The hook of the spring will allow the ratchet teeth to go in one direction, but not in the other.

3. A method of opening the bottom of the case by means of a spring knuckle, whereby the outside joint of the case is dispensed with.

4. Arrangement and combination of works applicable to the locking or unlocking of an alarum and to the setting off the striking part of a clock.

[Printed, 8*d.* See Repertory of Arts, vol. 9 (*third series*), p. 193; London Journal (*Newton's*), vol. 4 (*second series*), p. 264; and Rolls Chapel Reports, 7th Report, p. 130.]

A.D. 1831, January 22.—N° 6064.

ULRICH, John Gottlieb.—"Certain improvements in chro-"nometers."

[No specification enrolled.]

A.D. 1833, November 14.—N° 6506.

PACE, John.—A portable timepiece which shews the time by day, and whose dial can be illuminated so as to show the time by night. The dial is placed above the works; the motion work of the hands, and the movement of the timepiece being connected by an endless cord and pulleys.

[Printed, 5*d.* See London Journal (*Newton's*), vol. 17 (*conjoined series*), p. 217.]

A.D. 1833, March 20.—N° 6581.

BAKER, Thomas.—Consists in the application of the excentric movement, and that produced by the centrifugal force.

[Printed, 5*d.* See London Journal (*Newton's*), vol. 5 (*conjoined series*), p. 98; and Rolls Chapel Reports, 7th Report, p. 150.]

A.D. 1834, October 17.—N° 6697.

LITTLEWORT, George.—1. "An improvement on what is "called the palette." The safety edges are at right angles to the stems or legs that carry them, and can therefore be cut and polished to form a truer portion of a circle.

2. "An improvement in hanging the spindle or axle of the "balance wheel." The end of the spindle formerly supported by the main potance, is hung to a support which is independent of the main potance.

[Printed, 5*d.* See London Journal (*Newton's*), vol. 20 (*conjoined series*), p. 451.]

A.D. 1836, April 23.—N° 7067.

DENT, Edward John.—The inventor claims "the use and ap-"plication of any fit and proper flexible defensive coating or "varnish to the more effectual prevention of oxidation or rust in "the balance springs and adjustments of chronometers and other

" time-keepers." He describes a varnish suitable for the purpose, but expressly claims the application of *any* suitable sort of varnish.

[Printed, 3*d*. See Repertory of Arts, vol. 7 (*new series*), p. 271; and London Journal (*Newton's*), vol. 10 (*conjoined series*), p. 19.]

A.D. 1836, May 7.—N° 7083.

BANISTER, JOSEPH.—1. A mode of controlling the movement of the crutches in a clock through an invariable arc or length. The crutches being attached to the pallets which work in the teeth of the escape wheel, each pallet works on a separate arbor. Suppose the pendulum to be going towards the right, the left-hand crutch rests against one of two screws which are for the purpose of preventing the crutches, when released, from actually resting on the pendulum; the right-hand pallet is kept out of the perpendicular by a locking pin placed on a detent, which detent (being acted on by a weight and a spring), presses upwards against a pin. On the pendulum are two arms, with a balance at the end of each. As soon as (the pendulum going to the right) the balance touches the said detent, it forces it and its locking pin down, and the right-hand crutch is released. A counterpoise weight causes it to fall, striking the pendulum in its course, until it rests on one of the screws aforesaid. The pendulum, being thus propelled to the left, strikes the left-hand crutch, which gives way, and (in consequence of its pallet being raised from the escape-wheel, and the tooth of the escape-wheel acting on the sloped part of the pallet,) precedes the pendulum, passes its locking-pin, but is then by it prevented from returning until the pendulum releases it in the manner before described as to the right-hand crutch.

2. In a chronometer are two adjusting screws to prevent the pallet overshooting itself, which performs the like office of causing the propeller to move in a certain arc or distance.

[Printed, 11*d*. See Repertory of Arts, vol. 7 (*new series*), p. 195.]

A.D. 1837, April 22.—No. 7350.

ULRICH, JOHN GOTTLIEB.—1. A mode of ensuring a continued action of the balance of a chronometer, by means of improved escapements or mechanism, which prevents the liability of the works being brought to rest by any sudden shock or circular motion of the instrument in the plane of the balance, which are effected by means of novel constructions of detents.

2. Self-acting regulators, or modes of compensating for the expansion and contraction of the balance spring under variations of temperature, which also afford the means of employing a material for the balance which will not be subject to magnetic influence; and also a mode of adjusting the compensating parts of the pendulum of an astronomical time-keeper.

3. An improved mechanism for stopping the hands of a watch without interrupting the action.

4. A new mode of locking and unlocking the striking parts of such chronometers as report the time.

5. A mechanism for discharging the striking parts of an alarm or warning watch.

6. A mode of preventing the oxidation of the springs of chronometers, by covering them with a thin coat of some metal which is not liable to become oxidated.

[Printed, 3*s*. 1*d*. See London Journal (*Newton's*), vol. 17 (*conjoined series*), p. 121; and Rolls Chapel Reports, 7th Report, p. 186.]

A.D. 1837, November 2.—No. 7456.

GOWLAND, JAMES.—1. The communication of motion or impulses to the balance directly through the medium of the balance spring, whether according to any of the modifications shown in the Specification, or by an alternating lever, or in any fit and proper manner.

2. A revolving escapement bar, and a locking rim.

[Printed, 1*s*. 1*d*.]

A.D. 1838, June 9.—N° 7678.

MASSEY, EDWARD JOHN.—The patentee describes his claim as:—"Two detents upon separate axles, which give me the ad-
" vantage of using very delicate springs, and of locking the
" pallet wheel very near to the centre of a circular detent, and of
" unlocking it without passing the verge farther than is requisite
" in other chronometer escapements, so that the balance is less
" opposed in raising the locking, and in its return after receiving

" the impulse, by which means the same mean power is enabled
" to carry a much heavier balance."

[Printed, 5*d.* See Repertory of Arts, vol. 11. (*new series*), p. 93.]

A.D. 1838, September 13.—N° 7807.

MASSEY, EDWARD.—1. A new verge for the common balance-wheel watch. Notches are cut to receive the pallets, which are made of ruby or other stone sufficiently hard, and are cemented in the notches.

2. A detached marine chronometer escapement, having instead of straight springs, springs made in the same manner as common pendulum springs.

3. Watch escapement to drop seconds. The wheel, made similar to a duplex wheel, has two pallets acting on it. The leading pallet acts as a locking pallet only on the external tooth of the wheel, and when this is unlocked the wheel falls on the receiving pallet, and on the return of the balance it communicates the whole or nearly the whole of the impulse in one vibration instead of two.

4. The application of an endless chain and pullies to clocks made with fusee or barrel, so that the key, in order to wind up the instrument, is applied in the stand of the watch, being particularly adapted to clocks with glass shades over them.

[Printed, 5*d.*]

A.D. 1838, November 15.—N° 7874.

MACDOWALL, JOSEPH EDEN.—The object of the invention is to reduce the number of impulses by which the escapement axis is caused to make a revolution; the number being reduced to three, two, or even one. On the cylinder on the balance axis is an inclined plane; on the axis on which the locking piece is fixed is a screw with a projecting flange, and when the locking piece is unlocked this flange rolls down the inclined plane. The number of degrees of impulse will depend upon the quantity of space which the inclined plane extends over on the cylinder.

[Printed, 1*s.* 1*d.* See London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 361.]

A.D. 1839, June 27.—N° 8134.

NEWTON, William.—Improvements in the construction of sun dials, consisting of certain machinery, on which the plate and gnomon of a sun dial is to be mounted for the purpose of adjusting the position of the dial plate according to the varying difference between solar time and mean time. The dial plate is placed on a moveable saddle or easel, and on the fixed frame of the apparatus is a toothed wheel, with a graduated circle on its face divided into 365 parts to represent the days of the year. On the plate of the toothed wheel is an excentric plate, the edge of which is curved in such a manner that, with respect to each division of the circle of days brought under an index or pointer, the said curve presents for every day a projection or difference of radius corresponding exactly with the difference between the solar and mean time. A bent arm connects this with the saddle or easel, and forms a lever by which the dial is with the saddle or easel occasionally moved in a vibratory direction, so as to be placed at different inclinations to the horizontal plate.

[Printed, 7*d*. See London Journal (*Newton's*), vol. 16 (*conjoined series*), p. 352; and Inventors' Advocate, vol. 2, p. 36.]

A.D. 1839, July 6.—N° 8145.

PHILCOX, George.—"The patent diamond lever escapement." The detent or balance lever, which receives its impulse from the impelling lever, is called by the inventor, from its peculiar form "the diamond lever;" the part worked upon consisting of two sides at a slight angle to each other, so that there are three points of contact between the two levers.

[Printed, 5*d*. See Repertory of Arts, vol. 17 (*new series*), p. 21; London Journal (*Newton's*), vol. 16 (*conjoined series*), p. 325; and Inventors' Advocate, vol, 2, p. 135.]

A.D. 1839, December 11.—N° 8308.

GOUGY, Pierre Frederick.—The introduction into watches, clocks, and other time-keepers, of a supplementary second hand, so adjusted by mechanism that it may be stopped while the other second hand is going, and on being set free will recover its original position, and rotate as before along with the other.

[Printed, 7*d*. See Mechanics' Magazine, vol. 33, p. 65; and Inventors' Advocate, vol. 2, p. 386.]

A.D. 1840, March 7.—N° 8418.

MOLYNEUX, ROBERT.—The addition to the compensation balance, of a supplementary compensation balance, consisting of two pieces with projecting parts, which, when the balance is compensated, bank in contact with the inside of the balance rim, either at the parts near the arms or at the free ends according as the supplementary compensation is for higher or lower temperatures. The inventor also produces the same effect independently of the action of the balance rim.

[Printed, 5*d*. See Inventors' Advocate, vol. 3, p. 197.]

A.D. 1840, May 9.—N° 8501.

MOINAU, AUGUSTE.—Consists in the application of a series of detached weights as the impelling power for giving motion to clocks. This power is applied to a wheel fixed on the main arbor. This wheel has a series of arms attached to and extending radially from its periphery; at the end of each is a cup, formed to receive a ball, and these balls being severally deposited in the respective cups on one side of the wheel, produce by their gravitation a preponderating power on that side of the wheel, and thereby cause it to revolve. The balls to load the wheel descend down a slightly inclined tube and roll into a bent tube in connection with it, in which are pins or stops which prevent the balls from falling out. As the wheel revolves a lip on the side of each cup presses down the stop at the extreme end of the bent tube, and allows the first ball to fall out into a cup, and by a little mechanism the other stops inside the bent tube, are directly after depressed, and another ball allowed to roll to the extreme end of the tube. The stops are at the extremities of levers, the other extremities being acted on by weights. As the arms approach the lower part of their rotation, they discharge the balls into a trough, whence they roll down an inclined tube into a cylindrical box. This cylindrical box is detached and suspended by pivots from a long lever mounted on a fulcrum the short arm being attached to a rod connected to a crank on an axle. If this axle were by any convenient means turned at intervals one quarter round, the lever would raise the box so as to discharge the balls into the inclined tube first mentioned, whence they would roll down again for the purpose of loading the cups. Certain mechanism is applied to prevent balls rolling from the lower tube when the box is lifted up from it, and also for the proper position of the box in its ascent, in order that its mouth may be brought to the orifice of the upper tube for the purpose of discharging the balls. The balls may also be carried up to replenish the upper tube by means of an apparatus constructed like an archimedean screw pump. The patentee claims as part of his invention any apparatus or means of effecting the movement of the axle herein-before mentioned for the purpose of lifting the lever, and in particular claims the following:—From the axle extends a crank, which is by means of a joint attached to a rod. The upper end of this rod is connected with a lever, on a fulcrum, the other end being weighted. This lever is suspended near its middle by a hook and cord, and the cord, after passing over a series of pullies, is fixed to a lever fastened to the bottom of a door, so that every time the door is opened the lever draws the cord and thereby turns the axle. Instead of the lever at the bottom of the door the patentee sometimes works the machinery by the rising and falling of a float on the surface of water in a vessel.

[Printed, 7*s*. 8*d*. See Mechanics' Magazine, vol. 33, p. 480; and Inventors' Advocate, vol. 3, p. 323.]

A.D. 1840, May 23.—N° 8515.

DAVIES, James Callard.—The application of a train of watchwork to the fourth or last arbor of a train of clock wheels, so as to form a timepiece which only requires to be wound up once in 12 months; of which train the second or third wheel, or both, may be placed in front of the front plate, or behind the back plate, or, at any rate, outside the frame, so as to greatly diminish the size of the timepiece.

[Printed, 5*d*. See London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 87; Mechanics' Magazine, vol. 33, p. 503; and Inventors' Advocate, vol. 3, p. 357.]

A.D. 1840, August 13.—N° 8602.

PONCY, John Peter Isaie (*a communication*).—A mode of constructing clocks and chronometers so as to go for a longer period without being wound up; two main springs being used in combination with what the patentee calls his constant power or regulator, which is a double wheel, inside of which is fixed a barrel with serrated edges, having a spring and catch inside. This constant power is wound up every minute, and by it the power of the main springs is transmitted to the escapement.

[Printed, 7*d.* See Repertory of Arts, vol. 15 (*new series*), p. 223; Mechanics' Magazine, vol. 34, p. 190; and Inventors' Advocate, vol. 4, p. 117.]

A.D. 1840, September 10.—N° 8625.

DENT, EDWARD JOHN.—1. The impulse to the pendulum is at the centre of percussion, or as near to the centre as possible.

2. A compensation for expansion and contraction of the lengths of the pendulum. The arcs of oscillation vary in an inverse ratio to the variations of the lengths.

3. Three or more main springs act simultaneously, without the medium of a fuzee, upon the train of wheels.

4. Two intermediate wheels are placed between the barrel wheels and the centre pinion, in order to make the timekeeper go eight or more days at one winding up.

5. The arbors of the main springs are connected with a common arbor, as that the barrel arbors are wound up at the same time.

6. The timekeeper is placed in an atmosphere of dry non-corrosive gas, contained in an air-tight case, the winding-up arbor passing through and revolving in a stuffing box, so packed that all communication between the contained gas and the external air is prevented.

7. The application of "the well-known voltaic or electro-metal-"lurgic process" to the depositing of a thin film of gold or other metal incorrodible by the atmosphere, upon the steel balance spring and compensation balance, whereby rust is prevented.

[Printed, 9*d.* See Repertory of Arts, vol. 15 (*new series*), p. 280; Mechanics' Magazine, vol. 34, p. 249; and Inventors' Advocate, vol. 4, p. 180.]

A.D. 1840, September 24.—N° 8645.

JOHNSTON, JOHN.—The nature of the invention consists in the application of a suspended weight to the balance, so that this weight, by means of locomotion, may increase the number of the vibrations of the balance, and thus determine the space passed through by any locomotive body. Thus the effect of the weight on the timepiece, in consequence of the resistance of any body to motion, will be that, by two seconds being gained for one mile in respect to proper time, four will be gained in two miles, and so on. Of course, a watch for proper time alone must also be used.

[Printed, *5d.* See Mechanics' Magazine, vol. 34, p. 287; and Inventors' Advocate, vol. 4, p. 212.]

A.D. 1841, January 11.—N° 8783.

BARWISE, JOHN, and BAIN, ALEXANDER.—1. The application of the vibration of a pendulum to make and break alternately an electric circuit, so that an electric current may be transmitted as the moving power to clocks,—the attractive power produced in soft iron by an electric current being used for this purpose.

2. The application of an electric current in connection with a pendulum, to any number of clocks in succession, each clock being connected with a separate conducting wire. The application may also be to the clocks at the same instant.

3. The application of an electric current in connection with a pendulum, to wind up and keep going any number of clocks; to set in succession the hands of any number of electro-magnetic clocks; and to set the hands of an ordinary timepiece.

4. The application of conducting wires insulated in any of the usual ways, and twisted together so as to form a rope, for the purpose of transmitting electric currents as the moving power in clocks.

5. The application of electro-magnetism in lieu of springs and weights in ordinary pendulum-clocks.

6. The application of the vibrations of the balance in connection with the balance spring, to make and break the electric circuit at proper intervals, so that electric currents may be transmitted as a moving power to clocks and timepieces.

7. The application of an electric current to the striking of a clock.

8. The transmission, through a series of clocks, of an electric current.

[Printed, *2s. 8d.* See Mechanics' Magazine, vol. 35, p. 139; and vol. 39, pp. 65 and 97; and Inventors' Advocate, vol. 5, p. 71.]

A.D. 1841, May 4.—N° 8947.

MASSEY, FRANCIS JOSEPH.—The invention is for winding up watches by means of the pendant. Every push of the pendant acts upon the rack and moves four teeth of the ratchet on the going barrel. The pendant is returned to its place after every push by a circular spring. The patentee particularly claims;—

1. "Keeping the rack in action by means of a spring, with a stud "fastened in the rack, acting in a parallel slot."

2. "Using the stud in the rack, with a screw to adjust the "length of the pendant."

3. "Using a round pendant push piece, with a sliding stop," and also "making the pendant with a push-piece four-square, or of "such other form as to dispense with the necessity of any fittings "in the groove or middle part of the case, at the same time "allowing the pendant not to go close down to the edge of the "case."

4. The use of "a circular spring, acting at its point on an inclined "plane or arm of the rack, thus obtaining increased length of "spring, and doing away with the risk of breaking."

[Printed, 5*d.* See Mechanics' Magazine, vol. 35, p. 398; and Inventors' Advocate, vol. 5, p. 309.]

A.D. 1841, June 23.—N° 8997.

WALKER, William, the elder.—An improved form of escapement, consisting in making the teeth of the escape wheel of such a shape that the recesses between them form portions of circles; the ends or tops of the teeth being of an angular shape, lowest at the side where the teeth first touches the lever, and inclining upwards at an angle of about twenty-five degrees. These angular teeth act upon round pins moveable on an axis fixed upon the lever. By this invention, the friction is lessened and banking pins done away with.

[Printed, 5*d.*]

A.D. 1841, October 14.—N° 9120.

MASSEY, Edward.—1. Attaching compensation to the pendulum spring. The patentee uses a curb (acting on pivots placed over but not in connection with the verge) which is moved backwards and forwards on the pendulum spring by means of a small chain, one end of which passes round a pulley formed on the curb, the other end being attached to a lever acted upon by the compensation piece; the curb pulley has a spiral spring attached to keep the said chain on the stretch. Another method is by having a straight spring connected with the pendulum spring by means of a curb; the spring is lengthened and shortened by a clamp sliding in the frame; the clamp has a small chain fastened at each end; one chain connecting it with the lever acted upon by the compensation piece, the other with a lever which is acted upon by a spiral spring so as to keep the two chains always on the stretch, thereby causing a steady and certain action of the clamp up and down the grooves of the frame.

2. Relates to the arrangement of the locking pallets.

3. Winding up watches by means of the pendant. The pendant is connected to a plate which is capable of sliding in a dovetail groove in the pillar plate. This plate carries a catch which takes into the ratchet wheel fixed on the barrel arbor. The watch is wound by drawing out and pressing in the pendant, a click preventing the mainspring running down.

4. The action of the alarm part is by means of a small wheel with twelve teeth fixed on the upper part of the seconds' wheel. The hammer has a tail acted upon by this wheel, so that every tooth of the small wheel lifts the hammer, and therefore makes it strike every fifth second.

[Printed, 6*d.*]

A.D. 1842, March 21.—N° 9302.

DENT, Edward John.—1. Applying to the ordinary compensation piece, which the patentee calls the "primary compensation," a secondary compensation piece, "in all forms and positions," which shall augment or diminish the distance between the centre of gravity of the compensation weights, and the junction of the primary compensation piece with the bar.

2. Applying secondary compensation pieces, erected upon the ends of a diameter compensation bar, whereby the weights are raised by means of heat from their point of junction with the ends of the compensation bar, in which a curvature upwards takes place; the weights, being raised, are taken by the curvature quicker, and over a greater space of motion. On a decrease of temperature the reverse takes place.

3. The introduction of a second or "train" escape wheel, which revolves concentrically with the "impulse" escape wheel. The

mode of unlocking the escapement is the same as in the ordinary detached escapement, save that the two escape wheels are simultaneously unlocked by the same spring at each vibration. The result is that a constant impulse is given to the balance by the impulse escape wheel, without its receiving any lateral pressure beyond the pressure of the connecting remontoire spring.

[Printed, 8*d*. See Repertory of Arts, vol. 2 (*enlarged series*), p. 358; and Record of Patent Inventions, vol. 1, p. 145.]

A.D. 1842, August 8.—N° 9438.

PERRIN, Charles Henri.—Improvements in timepieces to prevent over-winding, and to prevent any harm arising from the key being turned the wrong way. The essential point in this invention is, that the central axis to which the winding-up key is applied is not fastened into the fusee or into the axis of the spring barrel, but is fitted into the fusee or into a central perforation through the axis of the spring barrel, with liberty to turn freely round, except as prevented by a toothed ratchet which is fastened on the said central axis, and by a detent which acts in the teeth of this ratchet; the centre of motion of which detent is borne by the fusee or by a piece affixed to the perforated axis of the spring barrel; and which detent will, by the action of a suitable spring, hold in the teeth of the ratchet when the key is turned the proper way, but will allow them to slip easily if turned the wrong way. The patentee makes the detent, in various ways, become wholly disengaged from the teeth of the ratchet, when the spring is wound up as far as it should be; and in consequence the key and the central axis to which it is applied, will be set at liberty to turn freely round.

Printed, 1*s*. 4*d*.]

A.D. 1842, November 8.—N° 9511.

INGOLD, Pierre Frederick.—" Improvements in machinery " for making parts of watches and other timekeepers."

[No specification enrolled.]

A.D. 1843, May 27.—N° 9745.

BAIN, Alexander.—1. Relates to the production and regulation of electric currents.

2. Making the pendulums of electric timepieces keep the same time. Two pendulums of the same length are suspended in the cases; in each case is a permanent magnet. Each has a multiplied coil of wire attached to a spring, which spring has a metallic catch attached to but insulated from it; a similar catch is attached to the pendulum bob. The pendulums will be kept in motion by clocks in the ordinary way. When the pendulums are near the extremity of their vibration to the left, and the catches upon the springs and catches on the bobs are in contact, the electric current is complete, and the coils, being attracted by the magnets, depress the catches, and allow the catches of the pendulum to pass over them. When the pendulums have passed, the current is broken, until upon their return vibration, the faces of the pendulum catches come in contact with the catches of the spring. Should one pendulum arrive at this point before the other, it must remain until the other comes up to it to complete the electric current.

3. Working a pendulum by means of electric currents. The pendulum bob is suspended by a steel spring so as to vibrate slightly between two horseshoe magnets with dissimilar poles facing each other. A small metal ball is fixed to a metal stem on a spindle carried by the pendulum, and is left free to move from side to side. An insulated wire is so connected with the pendulum rod and bob, and the ball stem, that, on the vibration of the pendulum to the left, the ball falls to the right, and resting upon a screw completes the electric circuit; the wire round the bob is then repelled by the left hand magnet, and attracted by the right, until near the extreme end of its vibration to the right, when the ball will fall to the left and thus cut off the current. The principle of attraction and repulsion of the electric conductor is the power applied to the movement of timepieces. An insulated coil of wire is suspended by two springs between two permanent magnets. When the instrument is placed in the electric current, and the current made and broken as aforesaid, this coil vibrates with the pendulum, and by means of a click acts on the teeth of the crown wheel, and catches a tooth every vibration, thus operating as an escapement, or a motion may be given to an escapement in the usual way.

4. Working electric timepieces without breaking the main conducting wire; several sets of instruments being connected to it by secondary conducting wires.

5. Relates to electric printing-telegraphs and signal telegraphs.

[Printed, 3*s*. 5*d*. See Mechanics' Magazine, vol. 52, p. 101; and Artizan, vol. 2, pp. 82 and 99.]

A.D. 1843, June 1.—N° 9752.

INGOLD, Pierre Frederick.—" Improvements in machinery " for making parts of watches, and other timekeepers."

[No specification enrolled.]

A.D. 1843, October 21.—N° 9915.

MYLNE, George Edward.—Watches made with sinks in the pillar plates for the barrel, third and fourth wheels and fuzee; whereby full framed watches may be made flatter than heretofore. The fuzee is similar to the plain or common fuzee, but it has a thin circular steel cap, and is inverted, and is cut the reverse way.

[Printed, 8*d*. See Repertory of Arts, vol. 4 (*enlarged series*), p. 91; Mechanics' Magazine, vol. 40, p. 318; and Engineers' and Architects' Journal, vol. 7, p. 155.

A.D. 1843, November 25.—N°. 9969.

LUND, John Richard.—Constructing compensation weights with laminæ of brass or steel round them, by the expansion and contraction of which, parts of the compensation weights, which the patentee calls the " correcting weights," will be acted on. One end of the correcting weight is made of gold, and as the temperature approaches 30° or 80° Fahrenheit is carried nearer to the centre of the balance, thereby varying the effect of the weight on the balance. The correcting weight must be adjusted in a particular way for mean temperatures, and its effectiveness very much depends on the distance between the said end made of gold, and the pivot on which the weight turns. The patentee describes two forms of correcting weights.

[Printed, 1*s*. 3*d*. See Repertory of Arts, vol 4 (*enlarged series*), p. 1.]

A.D. 1843, December 21.—N° 9993.

INGOLD, Pierre Frederick.—Relates to machinery for making parts of watches and other timekeepers. On the frame of the machine is clamped the mandril which is hollow; a table is also clamped to the frame, on which table are fixed on hinged joints the slide rest, the drilling frame, and the countersinking rest; these joints are to allow these "tool rests" to be readily thrown in and out of action. The mandril is bored throughout, and into it are fitted at each end brass bushes, sliding in which is a cylinder, which has screwed in it, by a left-handed screw, the cutter head which holds the facing cutter; this cutter has screwed into it another cutter; the large cutter faces the back of the watch plate, and the small cutter cuts it partially out of the blank or rough metal. A lever, working on a joint bolted through the back of the mandril head-stock, is used to bring the tool up to its work; the depth of the cut is regulated by an adjusting screw. There is a stop to keep the facing cutter out of action. The cylinder is also truly bored with the axis of the mandril, and in it slides a cutter holder, which carries the cutter which cuts the motion wheel, countersinks the adjusting screw, and regulates the depth of the cut. There is also another tool and cutter, similarly fitted, that slides in the cylinder, and is used to make the countersinks of jewelled holes. The eccentric slide works between bevilled guides. The chucking plate is divided on its face, and to suit the number and position of the wheel, countersinks pivot holes, upper plate and cock, screw and steady pin holes to be made in the watch plate. In the slide rest are used tools for facing; for facing the edge of the upper plate; for chamfering the edge of the upper plate; for cleaning up the pivot holes; and tools for the countersink pivot holes. The drilling frame is fixed to the main plate by a double joint, so that it may be used for other purposes also. In the countersinking rest are used the countersinking tools. When in use, their cutting edges like those of the tools used in the slide rest, are true with the axis of the mandril, as is also the axis of the drilling spindle. The invention also relates to a machine for stamping wheels, and also polishing the inner edge of the rim and the inner edges of the arms of the wheels at the same time. The principle on which this machine acts is not to punch the wheel out of the metal blank, but to punch the metal blank away from the wheel, leaving the wheel in the same position as when first put into the machine. The inner edges of the rim, and the edges of the arms are polished at the time the metal is punched away from the wheel, by means of an enlarged and highly polished part of the punch " taking off a very thin sliver of the metal, thus removing "the burr of the punch," while the highly polished surface of the enlarged part burnishes up the surface from which the sliver has been cut.

[Printed, 3*s*. 3*d*.]

A.D. 1844, October 14.—Nº 10,348.

NICOLE, ADOLPHE.—The patentee claims,—

1. Winding up watches by means of a rod running through the handle with a nob at one end, and a bevilled pinion at the other, which takes into a wheel, which wheel takes into another fixed on a plate, fixed by screws but capable of being moved on its axis in such a way that, if the rod be pressed in, it gears with and moves the wheel fixed on the fusee, and if the end be pulled out the wheels which communicate motion to the hands.

2. An additional second hand capable of being stopped and moved on as required, and made to arrive and start from a given point instantaneously. The additional wheel is carried by a cam wheel which moves freely on the axis, and this is pressed by means of a spring against a small steel wheel fixed upon the axis, by which the cam and small wheel travel round together. The cam wheel can be stopped by means of a lever moved from the outside of the watch, which lever coming under the said spring lifts it. The cam wheel is heart shaped, and a lever moving on its axis acts on it and brings it back to its starting place; this lever can be moved from the exterior of the case.

3. An escapement very similar to the ordinary lever escapement. The pallet which receives the impulse from the upper escape wheel, is similar to those used in the duplex escapement, but turns the contrary way. This pallet fixed on the axis of the balance, receives the impulsion of a spring, which spring stops against a screw (placed in front of the arm of the escape wheel) ready to be brought back to its old position by the next escape wheel tooth on the return of the balance. Another escapement is similar to the above with regard to the spring and the mode of giving impulse to the pallet, but varies in the mode of stopping the wheel, being similar to the duplex escapement as regards the wheel and roller.

4. Relates to the arrangement of banking pins on the arms of the balance.

[Printed, 7*d*. See Repertory of Arts, vol. 7 (*enlarged series*), p. 151.]

A.D. 1845, April 17.—N° 10,625.

PIGGOTT, WILLIAM PETER.—1. Dials and graduated plates manufactured by the electrotype process. A plate is prepared of suitable size with the necessary graduations and figures engraved thereon. A mould is then obtained in a composition of wax, and from this mould any number of similar plates in copper or other suitable metal may be obtained by the electrotype process. The mould may also be originally taken in copper from the plate by this process, and will be more durable.

2. Relates to the manufacture of compass boxes.

[Printed, 3*d.* See Repertory of Arts, vol. 7 (*enlarged series*), p. 239; London Journal (*Newton's*), vol. 27 (*conjoined series*), p. 338; and Engineers' and Architects' Journal, vol. 8, p. 358.]

A.D. 1845, September 25.—N° 10,838.

BAIN, ALEXANDER.—1. Relates to electric telegraphs.

2. Relates to electric clocks. Two brass brackets are screwed to the back of the case, and bear a hard-wood bar, which lays between the two upright parts of a bracket. Fixed on one end of this bar is another piece of hard wood, in which is inserted a piece of gold, the surface of which is made concave longitudinally, and on the surface of the cavity lies the gold soldered point of a steel bar. At this end the gold is always in contact. The other end of the steel bar is also gold soldered, and when it is in contact with a gold pin inserted in a piece of stone or agate, the circuit is complete. There is a "knee'd piece of brass" screwed to the pendulum rod, and there are two cylinders containing reels of copper wire covered with silk and screwed to the bracket below. The machine works as follows:—When the circuit is complete, the electric current passes by the conducting wire to the left-hand reel, from thence to the right-hand reel, thence to the gold in the wood, thence, by the gold points of the steel bar, to the gold pin, thence to the bracket below, and thence back to the ground. This passage of the electric current through the reels in the cylinder causes a magnet to be moved to the left, until a small ball comes against the end of the right-hand reel; but so soon as the pendulum has made its vibration to the left, the edge of the "knee'd" plate comes against a part of the steel bar, and pushes the bar a little to the left, so as to cause the gold point of the bar to be out

of contact with the gold pin. The circuit is thus broken, and the magnet, being adjusted so as to move by its own weight towards the right, instantly moves in that direction, and a pin on it strikes the pendulum rod, and gives it an impetus, until the "knee'd" plate is carried against another portion of the steel bar, and pushes it to the right until the gold point is again in contact with the gold pin, and the circuit is re-established.

3. Working clocks by magnetic electricity. The pendulum is worked in the above manner, and is suspended by two flexible springs, which are insulated from each other. The electric currents are produced by reels of wire in the cylinders of the pendulum passing to and fro over permanent magnets. The ends of the wires of these reels are joined together, and the other two ends are led up the back of the pendulum rod, and attached to the suspension springs, one to each spring. From the tops of these springs are wires which are led to the clock, thus connecting the wires of the pendulum with those of the clock. The circuit is always complete, there being no disconnecting apparatus. The currents are produced in reverse directions, according to the motion of the pendulum, which gives a similar motion to the magnet in the clock. A click carried on the magnet, acts on the ratchet wheel.

[Printed, 7*s*.]

A.D. 1845, October 10.—Nº 10,876.

HANSON, Charles.—1. A novel construction of detent. The detent is mounted vertically between the top and bottom plates of the chronometer, and is formed of a pin of steel turned to a true cylinder; a portion of the shaft is cut away for about two thirds of its diameter, forming a flat face. The lower part is turned to a smaller diameter, and has a lever secured to it; below the lever the shaft is cut away to nearly half its diameter, and made to present a flat face to the end of a spring which is fixed to the bottom plate of the chronometer; its use being to return the detent to its position, after it has been acted upon by the movement of the balance staff. Under the balance and on the same shaft, the impulse roller or pallet is mounted; there is a smaller cylinder placed on the balance shaft below the pallet, which, at its circumference, is provided with a projecting stud which acts upon the end of the lever of the detent, and forces the detent round part of a revolution. The flat face of the lever will be brought to a tooth in the escape wheel, until it clears the point of that tooth and allows it to pass on, whereby the escape wheel is released, and a tooth falls into the notch in the pallet, and gives an impulse to the balance. By this the pallet will be caused to move round until this tooth has cleared the notch in the pallet, the balance then returns and the stud drives the detent lever in the opposite direction, and is thus allowed to pass it, and assume its old position ready for a repetition of the above movement.

2. A detent which consists of a flat plate of steel cut away in the centre to form a notch, and provided, at its upper and lower ends, with pivots mounted on bearings so that the detent will rise and fall. Upon the lower end of one of the pivots a spring presses in order to keep the detent in its highest position. On the verge shaft is a small cylinder, attached to it, and provided on its upper face with a raised portion or inclined plane; when the detent falls through the action of this inclined plane, and arrives at its lowest position, the teeth of the escape wheel will pass through the notch.

3. The application of a spring to the verge shaft in place of the rigid pallet. The spring is of a peculiar form, and attached to the verge shaft; its end has an inclination inwards and rests against the verge. When the first tooth of the escape wheel is released from the detent, the third tooth will come in contact with the end of the spring, and drive it forward; thus communicating an impulse which will always be of the same power.

[Printed, 10*d.* See London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 258.]

A.D. 1846, April 25.—N° 11,177.

PHILCOX, George.—The invention consists in constructing the chronometer spring in two parts, or in adapting two springs in conjunction, so that as one spring, or one portion of the spring, expands or contracts from the variations of temperature, the other spring or portion of spring equally expands or contracts at the same time and in the same degree, but in an opposite direction.

[Printed, 5*d.* See London Journal (*Newton's*), vol. 29 (*conjoined series*), p. 317; and Patent Journal, vol. 2, pp. 476, 518, 647 and 675.]

A.D. 1846, April 28.—N° 11,178.

NEWTON, William Edward (*a communication*).—The invention consists in suspending clocks or timepieces by passing a cord or chain round the barrel cylinder or drum. The clock is suspended by the cord, which is fastened in the wall at the top and bottom, so that the weight of the clock acts as the propelling power instead of the ordinary weights and springs. When the clock requires winding up it will only be necessary to raise it to its highest point, the reverse motion of the barrel being precisely the same as winding up with a key.

[Printed, 6*d.*]

A.D. 1846, October 22.—N° 11,427.

HUTTON, John.—1. The employment of an auxiliary compensation on the principle of diminishing and increasing the resistance of the atmosphere to the motion of the balance in proportion as the temperature rises or falls. To the fixed end of a metallic thermometer, a light cap or lid, which nearly surrounds the balance, is attached by two arms made thin in one part. When the temperature rises, the free end of the thermometer expands with it, and a ruby, coming in contact with a regulating screw, raises the cap from the balance, which gives more freedom to the air around it, and diminishes the resistance to the motion of the balance; when the temperature falls the free end of the thermometer contracts, and another ruby acts on the regulating screw and produces the contrary effect, whereby the resistance to the motion of the balance is increased.

2. The application of a barometer, the rising and falling of the mercury in which, serves as a motive power to enlarge or contract the air space of the pendulum. The clock has a barometric tube fixed to one side of the case, in which is a piston or float with a light rod attached. An air resister consisting of a plain surface is suspended by spring rods from a bracket in the back of the case; on the top of the plate of this resister an inclined plane of an angular shape is fixed; this projects over the piston rod, which, as the mercury rises, presses against the inclined plane, which causes the plate to move inwards and thereby diminish the air space of the pendulum.

3. A compensation spring stud for watches and other timepieces, in which a balance and balance spring are employed. Two or more compound arms in conjunction with two or more springs, to which the balance spring is attached, act in opposition to one another, and maintain the balance spring in one position, and at the same time strengthen or weaken the springs.

4. An improvement in the "two-pin lever escapement." This consists in "inserting a solid piece of ruby or other hard stone in " the roller, and in placing the impulse notch in this ruby, and " forming the lower part of the ruby so as to receive the fork of " the lever."

5. A compensating pendulum consisting of three rods, the centre one being of less expansive metal than the other two; a tubular piece is made to slide on the centre rod; two spring levers are attached to the tubular piece, and weighted at their other ends by balls. The side rods are connected at the bottom with pieces attached to the spring levers, so that when the temperature rises the outside rods expand more than the centre one, and on a fall of temperature the contrary effect is produced.

6. A compensation collet to be attached to the balances of chronometers. The arms of the collet rest on the top of the balance which is slipped on to the same spindle. Near the fixed ends of the compensation pieces are two frames having valves placed within them; the valves in the first instance present their flat faces at right angles to the line of rotation or vibration of the spring collet; and in that position the pin of a small crank formed on the lower end of the separate spindles upon which they vibrate within the frames, takes into a slot in the free ends of the metal pieces. As the compensation pieces bend either outwardly or inwardly, the valves are turned round, and in either direction present less resisting surface to the air.

7. A compensation collet for timekeepers in which a balance spring is used. The free ends of the compensation pieces are attached by wires to a cross-piece. Every increase of temperature causes them to bend in an outward direction, and thereby increases the leverage at which the spring acts upon the balance; while every decrease produces a contrary effect.

8. A method of compensating for variations in the density of the atmosphere by varying the sectional area of the pendulum. The barometric tube and float before mentioned are used. The

pendulum bob has an opening in it, and the rise and fall of the float causes a door or valve to enlarge or diminish this opening.

[Printed, 1*s*. See Mechanics' Magazine, vol. 46, p. 435; and Patent Journal, vol. 2, p. 837.]

A.D. 1846, November 12.—N° 11,443.

YATES, Thomas.—Altering the number of teeth in the escapement wheel and its pinion, and also the wheel in which it acts, so as to make the balance vibrate only once for every half second, instead of four times a second. This may be done by making the escape wheel with twelve teeth instead of fifteen, the pinion below with eight instead of seven, and the wheel into which it acts as usual with forty. The lever thus becomes lengthened and is therefore capable of exerting greater power. By the above improvements the spring is considerably economized and much less friction is produced.

[Printed, 5*d*. See Practical Mechanics' Journal, vol. 2, pp. 9, 63 and 233.]

A.D. 1847, February 11.—N° 11,576.

BRETT, Alfred, and LITTLE, George.—" For improvements " in electric telegraphs, and in the arrangements and apparatus to " be used therein and therewith, part of which improvements are " also applicable to timekeepers and other useful purposes." The invention principally relates to electric telegraphs. The patentees cause the electric fluid to pass through a number of coils of fine wire, properly coated or covered with silk or other suitable non-conducting material, which wire is wound round a flat reel of ivory; the end of these fine wires being alternately brought into contact with the galvanic battery, whereby the current is made to act on and give motion to a partially magnetized ring or piece of metal suspended and moving in a plane parallel to the face of the flat reel. The patentees also use the said rings and reel of wire in the part of the invention relating to clocks.

Two of these partially magnetized rings are fixed to the pendulum rod by means of an oval tube, constructed so as to be moveable up and down the lower end of the pendulum rod for the purpose of adjusting their position. These rings move in a plane parallel with the face of one of the above-mentioned reels of wire and pass one on each side of the reel. The conducting wire of the battery is connected with the reel, which is suitably fixed; and a suitable arrangement must be made for alternately breaking and completing the current of electricity by the motion of the pendulum.

Or the reel may be made to vibrate, and the magnetized rings to be stationary; in which case the conducting wire from the battery must be brought down the back of the pendulum rod.

[Printed, 7*s*. 9*d*. See London Journal (*Newton's*), vol. 30 (*conjoined series*) p. 357; Mechanics' Magazine, vol. 46, p. 20, and vol. 47, p. 185; Artizan, vol. 5, pp. 201 and 275; Patent Journal, vol. 3, pp. 265, 282, 310 and 341; and Engineers' and Architects' Journal, vol. 10, p. 294.]

A.D. 1847, February 19.—Nº 11,584.

BAIN, Alexander.—1. The patentee remarks that, in former Letters Patent taken out by him, one mode of giving motion to clocks by means of pendulums acted upon by currents of electricity was by causing the pendulum to carry a coil of wire, which moved with the pendulum, while the magnets were held stationary, the currents of electricity passing through the coils being made and broken by means of a sliding bar or "break" acted upon by the pendulum. By the present arrangement the magnets are placed in a frame carried by and moving with the pendulum, while the coils of wire are wound round stationary frames.

2. In constructing the "breaks" or sliding bars, it has been usual to have gold points projecting from the sliding bar, these points being caused to travel to and fro over a smooth surface of agate, in which, and level with the surface of which, are pieces of gold in connection with the different wires. In this invention the gold ends of the wires are made to project in the form of points above the surface of nonconducting substance through which they pass. The point of a wire from one of the poles of a battery is constantly in contact with a groove at one end of the sliding bar. The other end of the bar is similarly formed, but, the points of wires terminating in the other pole of the battery being of a different height, in one position this end of the bar only rests on the point of the wire which is nearest to the centre of the sliding bar. The extreme part of this end of the sliding bar is on a different level with the other part, being lower, so that, as the bar is moved by the pendulum, this lower part is brought over and in contact with the outside wire and leaves the nearest wire,

thereby changing the direction of the current. If the bar be moved too far in this direction, the lower part of the bar is brought over the point of a wire which is not in connection with any battery, (which point is rather higher than that of the outside wire and thus the bar is lifted out of contact therewith), and thus the current is broken.

3. Working timekeepers by means of magnetic balances acted on by electric currents. The periphery of the balance is formed of magnetized plates of hardened steel. The balance has a circular motion to and fro within coils of wire, and on its axis is an arm or pointer projecting out, which acts on a bent part of the above-mentioned sliding bar. Another method is by having a wire from the positive pole of the battery attached to a spring which is constantly pressing against the periphery of a wheel, which, except one piece, is all metal; and when the spring presses against the metallic part the current is complete and the electricity communicated to the balance. On the said wheel are two bent arms which are alternately acted on by an arm on the axis of the balance (as mentioned in the former arrangement), and thus the spring is alternately thrown out of and brought into contact with the metallic portion of the periphery of the said wheel.

4. Relates to the "striking" part. On the arbor of the hour hand is a snail wheel "which is divided into equal radial divisions "with stops, one to each division." A segmental piece with ratchet teeth is fixed at the extremity of one end of a lever moving on an axis, the other end of the lever being an arm which rests against the snail wheel. Each time the pendulum moves to the right, it gives to a "clawker" a tendency to draw the segment in that direction a distance equal to one tooth, an arm acting at such a time as a click to hold it in the position to which it was last brought, while the segment has a tendency to move to the left from the action of a spring. Projecting from the surface of a wheel which makes one revolution per hour, is a pin, which every revolution comes in contact with a projection and raises the clawker, and thereby allows the ratchet to move. The arm of the lever is thus allowed to come on the division of the snail wheel next to operate, whereby the striking takes place. This portion of the invention further consists in a mode of making and breaking electric currents so as to give motion to striking apparatus situated at a distance.

5. Relates to modes of applying the alternate making and breaking of the current for the purpose of winding up.

6. Giving motion to clocks by currents of aeriform fluids; and also applying the same to effect the striking.

7. Mechanical apparatus in connection with currents of electricity, to be brought into action by the influence of the sun on a "thermo-electric pile," for the purpose of setting to time (at certain periods of time) clocks or timekeepers. Another method of effecting the same purpose is, by electrical apparatus brought into action by the influence of the sun's rays on mercury.

8. Relates to setting clocks to time by means of the falling of a ball at any given period of the day. The ball is capable of sliding down a vertical staff, and on this staff is a sliding ring to which is connected a rod, which, by means of a projection, rests on the horizontal arm of a lever. To the axis of this lever and to a plate are connected wires in connection with suitable batteries. When the ball falls, the said arm of the lever is depressed, and the other arm is thereby pressed against the said plate, and the circuit becomes complete, and the currents thereby put in motion can be conveyed to clocks in distant parts.

9. Another mode of setting clocks in distant parts is by electric currents brought into action by means of a clock in motion. On the hour axis, which is made to revolve once only in twenty-four hours, is a disc, and this disc, and the minute and second wheels, have each a notch. The time is indicated by a pointer fixed on the end of a lever, to whose axis is connected one wire. This lever has three projections, which are so placed as to fall into the three notches exactly at the same moment. When this takes place a metallic portion of the lever falls into contact with the other wire, and the circuit is completed.

10. Relates to modes of keeping up the supply of acidulated or other liquid in galvanic batteries for the purpose of giving motion to clocks.

[Printed, 5*s*.]

A.D. 1847, March 23.—N° 11,634.

HATCHER, William Henry,—1. Combining permanent magnets and voltaic or temporary magnets for giving visible signals for telegraphic purposes.

2. The use of the same arrangement to give signals by means of sounds differing from each other.

3. The use of the same for giving audible signals at the same time that visible ones are exhibited.

4. Refers to "the rheotome, or rheopeter," by which words the patentee designates apparatuses for breaking and completing electric circuits. He uses tubes or vessels of glass or other suitable material containing within them mercury or an amalgam of mercury. These tubes having had the common air expelled are hermetically sealed. Wires of platinum are previously passed through the sides of the tube, and the ends projecting into the interior form the means of connection of the mercury with the other parts of the circuit; the circuit being completed when both ends are touched by the mercury at the same time. These may be applied to pendulums to make and break the circuit.

5. Arranging electro-induction apparatus so as to render the transmission of a current in one or other direction for telegraphic purposes by moving one or other of two communicating mechanisms.

6. Setting the hands of one or more clocks or timekeepers so as to indicate the same time as the governing clock by means of electricity. Each of the clocks to be adjusted has a voltaic magnet, the poles of which project through part of the thickness of the dial plate. The minute hands are of steel or iron, and are made so as to slip round on their arbors. When the electric current is transmitted by the governing clock, the voltaic magnets draw the respective minute hands to the proper time. The mode of causing the governing clock to transmit the current which the patentee prefers, is by placing in the wheel which is placed on the arbor carrying the minute hand, a pin so situate, that, a few minutes before the time for setting, it comes in contact with a small spring, and depressing it brings a stud below the springs into contact with the mercury in a small cup, by which action it completes a circuit with a voltaic battery through the primary coil of an induction apparatus, of which the secondary coil has its ends connected with the two ends of the circuit in which the magnets of the series of clocks are, so that any secondary current which might be excited in the induction apparatus would be transmitted around each of these several magnets, and produce the effects detailed above. At the moment the minute hand points to the time fixed on, the

spring is released and the primary circuit broken, and at this moment the secondary current is transmitted to the clocks.

[Printed, 3*s.* 2*d.* See Mechanics' Magazine vol. 47, p. 357; and Patent Journal, vol. 3, pp. 452 and 474.]

A.D. 1847, July 3.—N° 11,776.

WEARE, Robert.—The invention relates to the application of magnetism and electricity to the vibrations of balances and pendulums, and consists :—1. In giving motion to the balance or pendulum by means of two semicircular permanent steel magnets, with their positions and negative poles facing each other respectively; these magnets vibrate freely on their own axis through a brass barrel, in which is contained a coil of copper wire covered with cotton. The wire is wound round a wooden reel with its centre hole sufficiently large to allow the magnetic balance to pass freely into it. The patentee describes several batteries to produce the electric fluid, and an apparatus which is to be placed between the magnetic coil and the battery in order to reverse the polarity of this coil, by which alternate reversion the continual and perpetual motion of the balance is kept up.

2. Giving motion to a balance by means of a magnetic needle passing through a coil of copper wire of an oval form such as that used in a common galvanometer.

3. Giving motion to a balance by having an electro bar magnet fixed to the balance staff. Placed in contact with the poles of this is a permanent magnet of a long shape, curved at both ends, so that the ends of the permanent magnet come opposite and close to the ends of the electro-magnet.

4. Giving motion to a balance by electricity alone, by means of "what is called a dry pile." The one the patentee uses is made of plumbago, zinc, and paper.

5. The application of electricity alone to the vibrations of a pendulum.

6. Giving motion to the balance by means of horseshoe magnets acting with the poles of a magnetic needle, causing attraction and repulsion every alternate vibration of the balance, by means of a lever worked by a small collet on the bottom of the balance staff.

7. The application of horseshoe magnets to the vibrations of a pendulum having a magnetic needle or bar applied to it.

[Printed, 1*s*. 8*d*. See Repertory of Arts, vol. 11 (*enlarged series*), p. 129; and Patent Journal. vol. 4, p. 175.]

A.D. 1847, December 1.—Nº 11,985.

MOENCK, Gustavus.—A detached escapement, dependent on the law of gravity, and totally independent of the wheelwork. On the axis of the escape wheel is a lever, of any desirable shape, which has an upper arm inclined at an angle, and which arm carries an adjustable weight. The lower arm of the lever is furnished with a pin, so as to permit it being taken hold of by a catch and spring. The motion of the pendulum one way releases it from this pin, and the weight causes the lower arm of the lever to advance, thereby giving a fresh impulse to the pendulum; it then strikes a spring and releases the escape wheel, which wheel carries the lower arm back again to its position behind the pin, ready to be again released by the motion of the pendulum.

[Printed, 5*d*. See Repertory of Arts, vol. 11 (*enlarged series*), p. 159; London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 182; and Patent Journal, vol. 5, p. 148.]

A.D. 1847, December 7.—No. 11,987.

EIFFE, James Sweetman.—1. Relates to balances, and consists in the application of arms out of the radial line at any angle of inclination, to the rim of compensating power, or to a balance rim constructed of one substance only. These arms may be made of any shape and direction, curvilinear or otherwise.

2. Relates to the pendulum of astronomical clocks and other timekeepers, and consists in the use of a receptacle of conical or varying form instead of the one of perfectly cylindrical form used in the pendulum known as "Graham's mercurial pendulum."

3. On the ends of two levers, the opposite ends of which are hammers, are pieces of steel which come in contact with two levers placed on the "anchor angles" of the pallets. During the outward motion of the anchor angles, these two levers are made to pass the pieces of steel without disturbing the hammers; but on the contrary motion, the hammers strike, and thus loud beats are produced simultaneously with the slight beat of the escape wheel

teeth. The levers may also be attached to the axis of the pallets instead of to the pallets.

4. A remontoir spring. "The remontoir keeps the bearing of " the driven leaf always with the action side in contact. The " motion from the barrel always keeps the spring wound up." A circular plate has three studs against which a brass disc is forced by the spring. "By the free motion of the disc on the axis, and " the resisting power of the three pins on the main plate, the " remotion " is produced.

5. The steel spring of the pendulum passes through a bracket, and the upper part is attached to a compensating adjustable lever.

6. "Burnishing the periphery of balances by a cylindrical weight " affixed and supported to its burnishing pressure by a strong " wooden frame, numerically applied to ensure uniformity and " truth, when the balance may be intersected for its compensating " use."

[Printed, 10*d*. See London Journal (*Newton's*), vol. 34 (*conjoined series*) p. 239; and Patent Journal, vol. 4, p. 498.]

A.D. 1848, May 11.—N° 12,154.

RESTELL, THOMAS, and CLARK, RICHARD.—1. Relates to escapements. The peculiarities consist in dispensing with the detent spring, lifting spring, compensating balance, and occasionally the balance or pendulum spring. The curve of the locking detent is also peculiar; consisting of a compound curve, one half of which is concentric with the periphery of the escape wheel, and the other half is obtained by shifting the centre of the curve a little on one side of the centre of the escape wheel.

2. Relates to the compensation of balance springs. The outer end of the spring is connected to the curved arm of a T-shaped lever, the opposite end of which has a graduated curved arm; a brass or metal arm or a tube of mercury presses against this graduated curved arm, and, as the balance spring elongates, itself will elongate and force the arm back, thereby shortening the balance spring.

3. Adapting musical boxes to clocks, so that the musical box plays immediately before the hour is struck. On the axle of a wheel in the clock which makes one revolution in an hour, is an arm, which, just before the termination of every hour, acts on

certain levers, one of which prevents the musical barrel from working until it is removed by being so acted upon.

[Printed, 1*s*. 1*d*. See London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 232; Mechanics' Magazine, vol. 49, p. 502; Artizan, vol. 7, p. 105; and Patent Journal, vol. 6, p. 84.]

A.D. 1848, July 11.—N° 12,207.

ROBERTS, Richard.—1. The application of the influx and efflux of the tide for effectuating, directly or indirectly, (by hoisting weights for that purpose,) the motion of clockwork.

2. Arrangements in connection with turret and public clocks, whereby the difficulty of placing the "guide pulley" at such a distance from the barrel as will admit of an equal distribution of the cord or chain throughout its entire length is avoided, and by which arrangements two or more chains may be actuated by one weight and one cord, the effect of which shall be equimotive at all times.

3. Apparatus whereby the time shown by the dial of one clock can be shown at other dials simultaneously.

4. Imparting equi-motive impulses to clock escapements, and compensating for the effects produced by change of temperature on the pendulum rod.

5. Causing the hands of timekeepers to be advanced at definite intervals of time, which shall correspond with a certain definite number of oscillations of the pendulum.

6. The construction of and application to clocks of a transparent cycloramic dial or index.

7. The adaptation of toothed sectors and other apparatus for effecting the striking of the hours and quarters, the same being substituted for the ordinary trains made use of for such purpose.

8. Relates to compensation balances adapted for pocket and box chronometers.

9. Escapements for chronometers and watches whereby the motive power is regulated so as to impart equimotive impulses to the balance. An extra hair spring is used, and the agency of the fusee may be dispensed with.

10. Enabling chronometers and watches to beat dead seconds with the ordinary train of wheels only.

11. Mechanism by which the duration of intervals of time may be ascertained, without effecting the motion of the timekeeper.

12. A machine called "a normal drill" for the purpose of drilling and boring with accuracy frame plates and other parts of timekeepers.

13. Hardening and polishing frame plates.

[Printed, 4*s.* 9*d.* See Mechanics' Magazine, vol. 50, p. 67; Artizan, vol. 7, pp. 133 and 232; and Patent Journal, vol. 7, pp. 17 and 59.]

A.D. 1849, March 14.—N° 12,516.

PAYNE, WILLIAM.—The patentee claims an improvement in clocks which indicate the hours, half hours and quarters by means of musical intonations or chimes. Instead of having bells struck by hammers with the usual machinery, the patentee uses a barrel studded with pins so arranged and calculated as to produce the musical chimes by acting upon elastic metal springs fixed securely in the framework of the clock.

[Printed, 5*d.* See Mechanics' Magazine, vol. 51, pp. 282 and 361; and Patent Journal, vol. 7, p. 250.]

A.D. 1849, March 14.—N° 12,522.

CHAUFFOURIER, PIERRE AUGUSTIN (*a communication*).—Dividing the depth of the watch into two horizontal compartments. The main spring is set at the exterior plate so as to occupy the entire space of one of these compartments; the other parts of the mechanism occupy the entire space of the other. These latter are the ordinary works, but have to be arranged so as to agree with the displacement of the moving power.

[Printed, 6*d.* See Mechanics' Magazine, vol. 51, p. 283.]

A.D. 1849, April 16.—N° 12,567.

SHEPHERD, CHARLES.—" Improvements in working clocks " and other timekeepers, telegraphs, and machinery by electricity."

1. The application of electricity to winding up the impulse spring or weight in the remontoir escapement. The apparatus for giving the impulse consists of a bar magnet supported by a spring attached to a bracket. The spring from its point of junction with the bar magnet is continued in the form of a rigid bar. An electro-magnet causes the bar magnet to oscillate, carrying the bar with it. The remontoir or impulse giver is a rigid bar supported by a spring attached to the aforesaid bracket. When the bar magnet oscillates,

a pin on the bar upon it comes in contact with the remontoir spring, carrying it to the full extent of its motion, when the extreme end of the remontoir spring slips under a detent, where it is locked until released to give the impulse. This detent is unlocked by the point of a screw passed through the pendulum; the impulse spring being released falls on the point of another screw in the pendulum rod and gives the impulse, and after doing so rests on a banking screw until the like action is repeated by the oscillation of the bar magnet. The completion of the current is effected by the contact of a platina piece on the pendulum with the end of a spring fastened to an insulating bracket, the end of the spring carrying a platina pin. The patentee also applies the above when a weight is used.

2. Giving audible signals by means of a locking plate and apparatus connected therewith, actuated by electro-magnetism. The first mover consists of a pair of pallets supported on an oscillating axis, which pallets at each oscillation cause a ratchet wheel on the arbor of the seconds hand to rotate the distance of half a tooth at each movement of the pallets. To the oscillating axis are attached two bar magnets the ends of which are alternately attracted and repelled by two electro-magnets whereby motion is given to the pallets. The seconds wheel revolves once in a minute and carries a projecting pin; the minute wheel also carries a pin and revolves once in an hour. Once in an hour therefore these pins are at similarly relative positions. When this happens the secondly mentioned pin causes an arm working on a pivot to come in contact with the first-mentioned pin, and then the poles of an electro-magnet attract an armature and thereby lift a detent from the locking plate, on whose arbor is a ratchet wheel, into whose teeth work two pallets; and the arbor of these carries an arm supporting an armature over a second electro-magnet. When the detent is lifted from the locking plate one end comes in contact with a platina point in a plate above it, and the whole circuit is complete, and the ratchet wheel is moved until the detent falls again into a notch of the locking plate. The last-mentioned arbor carries a hammer.

3. A method of diminishing the oxidation of the platina points. A glass vessel is supported from the pendulum rod, and in it is suspended a weight. Break points are introduced through the sides of the glass vessel, and come in contact with the weight as

the pendulum, and the glass with it, oscillate. The vessel contains hydrogen, in order that the platina points may not be oxidized.

4. The impulse or remontoir spring is supported in a bracket as above mentioned, and at the other end branches into two arms, one of which acts on the impulse pallet in the large roller, and the other on a detent furnished with a discharging spring, as in the ordinary escapement. An arbor in the centre carries the two bar magnets, the arm which carries the " winding up " pin of the impulse spring, and also an arm which carries a pin for moving a detent for the purpose of breaking contact between the platina points of two springs, and thereby breaking the electric current.

5. " An improved escape wheel and pallets." The driving arm in connection with the bar magnet, is divided into four points of contact, two of which act as driving pallets, and two as detents to the escape wheel teeth. The above may be applied to actuate telegraphic hands or pointers.

[Printed, 2*s*. See Mechanics' Magazine, vol. 51, p. 382; and Patent Journal, vol. 8, pp. 43 and 46.]

A.D. 1849, June 12.—N° 12, 656.

PREDDY, William.—Closing the pipes of watch keys when not in use. The patentee does this in various ways, such as;—by having a sliding square or piston inside the pipe of the key, which is kept in its place when not being used by a spiral spring above, or by a spring at the side, or by having a moveable sheath or stopper; or by having a square piston fitting the pipe, having a thumb piece by which it is pulled up or pushed out as required. The latter plan is most applicable to the keys of clocks.

[Printed, 5*d*. See London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 410; Mechanics' Magazine, vol. 51, pp. 573 and 588; Artizan, vol. 8, p. 40; and Patent Journal, vol. 8, p. 163.]

A.D. 1849, July 18.—N° 12,711.

BROWN, William, SHAPPLE, Henry, and WILLIAMS, William."—" Improvements in communicating intelligence by " means of electricity, and improvements in electric clocks."

[No Specification enrolled.]

A.D. 1850, February 28.—N° 12,983.

PEPPE, George Tosco.—A method of regulating the descent of a column of mercury contained in a glass tube, by causing its rate of motion to depend on the air beneath the mercury in the tube passing by a regulated orifice to the portion of the tube above the mercury; and the application of this regulated motion to indicate equal portions of time.

[Printed, 5*d*. See Repertory of Arts, vol.16 (*enlarged series*), p. 282; London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 168; Mechanics' Magazine, vol. 35, p. 178; and Patent Journal, vol. 9, p. 270.]

A.D. 1850, October 3.—No. 13,268.

TIFFEREAU, Cyprien Theodore.—" Improvements in Hy-" draulic Clocks." 1. The application of a syphon set on a floating board. As the water is taken from one vessel to another, by the agency of the syphon, the sinking of the latter shows the result on a graduated dial or scale.

2. The application of a "syphon bowl which is set flowing by " the peculiarity of its configuration, and gives directly a swinging " motion by filling up and emptying itself." Attached to this bowl is a lever, which, by the intermediate aid of an arm, communicates the motion to a lever which oscillates on the center of a clock dial placed above, and thus moves the hands by the aid of usual clock wheels.

3. The application and use of the bowls or cups, which are adjusted to both branches or arms of the syphon, having small holes in them, and which, at the same time that they regulate the flowing out, keep up constantly the running-off action of the syphon.

[Printed, 10*d*. See London Journal (*Newton's*), vol. 38 (*conjoined series*), p. 323; Mechanics' Magazine, vol. 54, p. 299; Practical Mechanics' Journal, vol. 4, p. 36; and Patent Journal, vol. 11, p. 14.]

A.D. 1851, March 17.—N° 13,558.

MINTON, Herbert, and HOFFSTAEDT, Augustus John (*partly a communication*).—1. Manufacturing faces or dials of plastic clay or other analogous plastic material.

2. Manufacturing them of powdered clay, or other analogous compound or substance by pressure. The requisite devices for the faces may be applied by any of the well-known printing or painting processes.

3. The application of the process employed in the manufacture of encaustic tiles to the manufacture of faces or dials.

[Printed, 3*d.* See London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 109; Mechanics' Magazine, vol. 55, p. 257; Artizan, vol. 9, p. 263; and Patent Journal, vol. 11, p. 303.]

A.D. 1851, April 10.—N° 13,587.

M^cDOWALL, CHARLES.—" Improvements in the construction " of timekeepers." In the forms set forth in the drawing to the specification, the invention is shown in the substitution of an excentric pin or a one-toothed wheel in lieu of the ordinary escape wheel. The patentee does not confine himself to any particular modification, but states that his new escapement has this peculiarity; viz.—" that it will impart an impulse to the pendulum or " balance while in the middle of its vibration chiefly by a direct " instead of an oblique action."

[Printed, 6*d.* See London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 16; Mechanics' Magazine, vol. 55, p. 318; and Patent Journal, vol. 12, p. 24.]

A.D. 1852, May 29.—N° 14,146.

BAIN, ALEXANDER.—The only part of this invention that relates to clocks consists in improvements in electric clocks and timekeepers; the improvements consisting in causing the system of clockwork that gives motion to the magnets to be constantly controlled and regulated by a second system of clockwork.

[Printed, 2*s.* 3*d.* See Repository of Arts, vol. 21 (*enlarged series*), p. 137 and Mechanics' Magazine, vol. 57, p. 476.]

PATENT LAW AMENDMENT ACT, 1852.

1852.

A.D. 1852, October 1.—N° 40.

HOLL, Frederick Richard.—This invention consists:—1. "Of the use of a strong bent spring, fixed at one end and " connected at the other to a bent arm, which carries a rolling " surface, which by acting on a curved rack moving on a centre " gives motion to that rack, which gives motion to a pinion, which " in turn gives motion to the other parts of the works." The peculiarity of the above consists in using the frame as the part to contain the power; which motive-power is a short bent spring, which only requires to be bent to a curve of smaller radius by leverage, instead of a long spring that requires winding up. As the spring decreases in power, the leverage becomes more favourable, so that the power required for each tooth of the curved rack is nearly equal.

2. " Of an improvement of the chronometer escapement, by " which the locking spring is acted on through a diagonal attached to it, in place of being acted on directly at its end."

[Printed, 7½*d.*]

A.D. 1852, October 2.—N° 147.

WHELE, EDWIN.—1. Relates to apparatus to burn candles so as not to require snuffing, or to be self-snuffing.

2. Relates to a lamp where the candle is made to consume at a regular rate, by the application of more equal pressure for the purpose of keeping the candle up to the nozzle of the lamp. This is done by weights attached to the push up and working over pullies; or by elastic bands attaching the nozzle to the push up; or by a spiral spring under the push up; or by the application of pullies combined with other springs.

3. By means of his aforesaid lamp the patentee applies the upward movement of the candle to turn the hands of a dial or clock face and to show the time, and to ring or strike an alarum and strike the hours.

[Printed, 6½*d.*]

A.D. 1852, October 4.—N° 214.

KENNEDY, THOMAS.—" Improvements in obtaining and applying motive power, which improvements or parts thereof are " applicable to timekeepers and clockwork, and for measuring and " registering the flow of water and other fluids and aeriform " bodies." According to one modification, the apparatus consists of a cylinder, closed at each end, and fitted with a piston working fluid tight, or nearly so, within it, the rod of the piston being passed through a stuffing box in the cylinder cover. A cord from the rod is passed over a pulley having at the other end a counterweight sufficient to balance the weight of the piston and its moving connections. The motive fluid is conducted to the apparatus by a pipe, which diverges into two branches, each fitted with a valve of similar action. These valves, from which pipes to the upper and lower parts of the cylinder pass respectively, work together so that when one is open to admit water to the cylinder beneath the piston, the other is closed to shut off the communication between the supply pipe and the opposite end of the cylinder above the piston, while at the same time the latter opens up a free discharge for the fluid above the piston. Both discharge outlets from the valves are combined into a single discharge pipe. There is a pin on the pulley, so set that, when the piston arrives at either end of its stroke, it (the pin) elevates a tumbler which is loose on the drum shaft as a centre, and the tumbler then falls over on the other side of its vertical centre of motion. In its fall it acts on the lever of the two connected valves, which are thus simultaneously and instantaneously reversed. A continuous reciprocatory action of the piston is thus kept up. The power so obtained may be taken from the apparatus in various ways, either from the piston rod, or the pulley or drum, or other moving detail. Among other things the patentee applies the above arrangement or a modification thereof to time-keepers or clockwork.

[Printed, 11½*d.*]

A.D. 1852, October 9.—N° 324.

RESTELL, THOMAS.—1. Relates to escapements, and consists in the production of an alternate motion from the continuous revolution of a cam, so made that the axis passes somewhat out of the centre of some or all of the circular arcs which form the outer edges of the said cam, this cam actuating a lever in which are fixed two studs or pins, between which the cam acts. In connection with the said lever when used in giving impulse to the balance, instead of employing both a detent and a lifting spring, the patentee only uses one of these, but of greater sensibility, which is affixed to the end of the lever. Complete circular cams may also be used.

2. Relates to the employment of the said cams to roasting jacks.

3. Relates to the employment of a slide in conjunction with a circular arm of compound metals, whereby the balance spring is lengthened or shortened for the purpose of compensation. This is effected by the action of the circular arm upon a lever, to the end of which the spring is affixed, the slide being used to produce the necessary length or active power in the circular arm. The slide acts on a curved part of the lever, and the part to which the spring is fixed is also curved.

4. Relates to a mode of using pallets in a lever watch, so that there shall be upon the one end thereof no locking of any kind, the escape wheel being detained only upon the other side of the same, the balance affecting the lever or lock upon which the pallets are fixed only at its second vibration.

3. Relates to a construction of clocks, in which the use of a pendulum is dispensed with by the substitution of a ball or balls rolling on wire and returning again to the place they started from, so that each ball is again conveyed to the power producing motion, and thus maintains the action of the clock.

[Printed, 1*s*. 2½*d*.]

A.D. 1852, October 15.—N° 408.

MATTHIAS, WILLIAM JAMES, and BAILEY, THOMAS.—

1. Distributing the power over the machinery of clocks so as to be applied direct to the twelve hour action, instead of the one hour action.

2. Arranging the works so that the going or time-keeping parts shall receive motion from the striking action, and that by winding up the striking action the time-keeping action shall be wound up, by which arrangement also the running down of the striking action keeps the going action in motion.

3. Regulating and governing the action of clocks by means of a screw remontoir movement, which may either be combined in the same case with the other parts of the clock, or in a separate case at any requisite distance. This is particularly applicable to turret clocks.

4. The application of the power direct to the twelve hour action to watches also.

By the above arrangements the fusee is dispensed with, and also the works of the timepiece are compressed into such a narrow space as to afford room for illuminating.

[Printed, 8½*d.*]

A.D. 1852, October 19.—N° 438.

HARCOURT, Joseph, and **HARCOURT**, William.—*Void by reason of notice to proceed not having been given within the time prescribed by the Act.* The Provisional Specification states the invention to be, " The application of porcelain, glass, or earthen-" ware to articles in which or for which those materials have never " heretofore been used." The only articles mentioned as relating to clocks are, " spires for bird cages and clock cases."

[Printed, 2½*d.*]

A.D. 1852, November 11.—N° 706.

LUEDEKE, Ernst.—*Void by reason of notice to proceed not having been given within the time prescribed by the Act.* The patentee in his Provisional Specification says, " I intend by the " use of a pendulum, double wheel, and springs to produce vibra-" tion; such vibration being first produced by the springs, and " kept up by the concurrent action of the pendulum, wheel, and " springs, which reciprocate, or in other words give and receive, " impulsive power from each other." He also states that the invention would, in fact, be perpetual motion if no part thereof should be displaced, broken, or worn out by friction.

[Printed, 2½*d.*]

A.D. 1852, November 13.—N° 730.

PHILCOX, George.—" Improvements in marine chronometers " and other timekeepers." The balance is made with volute duometrical springs, being another application of the double spring explained in the patent (No. 11,177) for the cylindrical double spring. The patentee obtains half seconds with the fifth wheel, or with a nine cut lever. In the escapement the impulse is given in the line of centres. The staff is jewelled with a ruby or other stone, instead of a hollow roller.

[Printed, 6½*d.*]

A.D. 1852, November 16.—N° 770.

O'KEEFFE, John.—*Void by reason of notice to proceed not having been given within the time prescribed by the Act.* The Provisional Specification states the object to be as follows :—" To make watch " cases out of metal plates or sheet metal by means of screw " press (somewhat similar to the ordinary screw copying press) " furnished with internal and external dies, the latter so con- " structed as to correspond in shape and size to the internal and " external dimensions of the part of the case to be formed when " completed."

[Printed. 2½*d.*]

A.D. 1852, November 30.—N° 911.

ADDISON, John.—*Void by reason of notice to proceed not having been given within the time prescribed by the Act.* The invention is for ascertaining the hour of the day by means of a pocket sun dial, and the Provisional Specification states that, " It can be con- " structed of tin, german silver, or any other metal, or of porce- " lain, and can be regulated by the metallic plate at the back of " the dial, with as much accuracy as the most expensive made " watch ; and this is necessary, as when the days begin to shorten " it loses at the rate of three minutes every two days, and as the " days lengthen it gains three minutes in two days, This plate is " 2½ inches long by ½ inch broad, and attached by a screw to the " centre of the dial on which the plate or regulator is moved. On " the top of this the handle is fixed, which is done by a small pin " made to fit loosely so as to form a pivot for the handle to move

" upon, and which allows it to be held without occasioning the " slightest leverage, which would otherwise be the case, and " thereby prevent the hour being accurately ascertained.

" Previous to returning the dial to the pocket, the hand is " turned upon its hinge to the back of the dial, and the handle is " turned on its pivot so as to rest on the plate or regulator. This " dial can also be used for nautical purposes."

[Printed, 4½d.]

A.D. 1852, December 2.—N° 938.

MILLAR, Charles.—This invention relates to the employment of a stream of water for the actuation of clock-work, chimes of bells, and similar mechanism. The water is conducted by a pipe so as to flow at a slow rate upon the buckets of a small water wheel, the shaft of which is suitably geared with the hour and minute wheels. Afterwards the water flows over a larger wheel, connected so as to drive the quarter department of the clock for ringing the quarters. The water then flows over a still larger wheel connected with the hour ringing action, and finally flows into a cistern for use in ringing the alarm bell or bells. The bell is fixed with its mouth uppermost, and so contrived that two distinct tones are obtained from it; one by striking the bell on the lip, the other by striking it about two thirds down its side. In connection with the hour or minute spindle is a disc which revolves once in twenty-four hours; and on its edge are wedge-shaped recesses arranged to suit the time for ringing. Into these the point of a lever falls as the disc revolves, which lever is connected with the discharge of the said cistern, so that at the period intended a valve is opened, and the water flows over a waterwheel connected with the tilt hammers of the bells. The valve is acted on from below, and on its lip inside the cistern is a syphon, the shorter end of which is made to suit the intended time of ringing; thus furnishing a definite time to start and to stop.

[Printed, 4½d.]

A.D. 1852, December 4.—N° 957.

ROWBOTHAM, John (*a communication*). — " Improvements " in Timekeepers and Apparatus connected therewith for ascer- " taining the attendance on duty of watchmen and other persons

" having charge of property." Either by means of the arbor of the hour pinion, or by other means, a plate is made to turn round with a motion corresponding with that of the hour hand. A loose dial of paper or card-board is fixed on this, and is then covered up by the back of the watch case, in which is a small hole for the insertion of a stamp or type with a letter marked on it; the duty of the watchman being to dip this in ink, and then make a mark on the revolving dial at stated times. There is a small reservoir for the reception of ink, or other coloring matter, placed in any convenient part in the watch. The types may be fixed to the wall of a room by a chain, and the timepiece be portable, or the latter fixed and the types moveable or hung within reach. The patentee also claims a mode of locking the watch case. The case shuts by a snap or hook, which is detained or released at option by one end of a lever which is pressed down by a spring, and the whole is acted on by a screw in the handle or pendant. The screw is turned by a key, so made that, when the case has been unlocked, it cannot be withdrawn without being turned back again, and thus re-locking the case.

[Printed, 5½*d.*]

A.D. 1852, December 8.—N° 1004.

HOPKINS, Joseph.—" Improvements in obtaining a straight " line parallel to the axis of the earth, or in rendering the axis of " a tube or a telescope parallel thereto." " This parallelism is " obtained by making one extremity of a line or axis the centre of " a circle, the radius of which is equal to the tangent of the north " polar declination of any close circumpolar star; the line being " then made perpendicular to the plane of such circle, and the " eye placed at the other extremity of the line, the circumference " of the circle is made to coincide with the circumference of the " circle apparently described by the star, by making corresponding " points on those circumferences coincident." The invention may be applied to the construction of sun dials.

[Printed, 6½*d.*]

A.D. 1852, December 9.—N° 1011.

LOSEBY, Edward Thomas.—1. The application to the balance of curved tubes, containing mercury or other fluid, in addition to the ordinary compensation; the tubes being arranged in such a position as to cause the mercury, on expanding by an increase of temperature, to approach the centre of the balance at an accumulating rate, corresponding to the law of alteration in the elastic force of the spring.

2. The application to the ends of the vessel containing the mercury, (when used as applied to a pendulum), of stuffing boxes into which hollow plugs, that allow of the passage through them of the pendulum rod, are screwed, and by that means the mercury is prevented from escaping from the vessel.

3. In order to remove the difference in the time of the pendulum's vibration between long and short arcs of oscillation, the patentee causes a pin, projecting from an arm affixed to the pendulum rod, to move in the coil of a compensating spring, secured by a clamp, or otherwise, to any convenient adjacent fixed point, and, as the pendulum vibrates, this pin will draw the spring into an elliptical form, while the reaction of the spring will give the required impulse to the pendulum.

4. Regulating turret clocks by the aid of an ordinary-sized astronomical clock. To the arbor of the fourth wheel is attached a detent lever, the extremity of which rests upon the fifth wheel arbor, which is recessed to form a bearing for the detent. The fifth wheel has a portion of its teeth removed, and one of its arms carries an adjustable weight. The opposite end of the fifth wheel arbor to that on which the detent rests, carries a second detent, which rests against the scape wheel arbor of the small astronomical clock; that arbor being recessed at opposite sides, to form bearing surfaces to the forked end of the second detent lever. Once a minute, as the seconds hand of the small clock arrives at 60, one notch in the scape arbor allows the forked detent to pass, which, being liberated, permits the weight of the fifth wheel to give that wheel an axial motion, and so liberate the other detent lever; at the same time it causes the teeth of the fifth wheel to fall into gear with those of the fourth wheel. The detent of the turret clock being free, the large train and hands are set in motion, regulated by the ordinary fly, whilst the fifth wheel is carried round until it arrives at the part where the teeth are wanting, when the weight causes the wheel again to fall out of gear with the fourth wheel, and the forked detent to rest against the scape arbor. The train continues to move until the first-mentioned detent has made

one revolution, and again assumes its quiescent position on the circular part of the fourth arbor. During this time the larger hands will have moved through a space denoting one minute, and they will then remain stationary until again released by the small clock, when the like action will be repeated. To prevent the forked detent from falling on to the flat part of the 'scape arbor, instead of the circular part, it is made with two prongs or arms, the second of which projects from the detent in advance of the other, which retains the detent until the discharging notch in the scape arbor has moved half-way round, when it escapes through a notch cut on the opposite side.

5. The pendulum clock and its case are supported on a bracket. The case is of glass with a hemispherical end, having an opening in it to allow of the regulating of the pendulum.

[Printed, 6½*d.*]

A.D. 1852, December 14.—N° 1051.

WEBB, JOHN.—The invention consists in embossing or engraving, or producing the resemblance of embossed or engraven designs on the surfaces of enamel watch dials. The patentee draws a design on an ordinary enamel dial, and then applies some acid to the parts intended to be sunk or cut in. After the acid has remained on a sufficient time, the dial is cleansed with oil, and polished in the usual manner.

[Printed, 2½*d.*]

A.D. 1852, December 23.—N° 1148.

ROPER, WILLIAM.—*This invention did not proceed to the Great Seal.* It consists, according to the Provisional Specification, in
" shaping sheet metal into boxes, watch cases, and other articles,
" by the employment of soft metal (subjected to pressure or
" impact) to cause the sheet metal to take the form of dies, the
" soft metal acting as a forcer, and is melted out after the desired
" form has been obtained, by which means not only is form or
" shape given to the metal, but at the same time any engraved or
" other ornaments on the dies are produced on the metal."

[Printed, 2½*d,*]

A.D. 1852, December 29.—N° 1187.

KIBBLE, Henry.—*Void by reason of notice to proceed not having been given within the time prescribed by the Act.*—The Provisional Specification declares the nature of this invention for " A " Traveller's Monitor, or Ticket and Parcel Protector," to be as follows:—" A double casing is made to a hunting watch, having a " pendant through which the chain or ribbon (used to suspend " the monitor as a watch) is passed. The interior face of the dial " is numbered similar to a watch, but with any number of figures " from 1, upwards. The exterior or surface has an elastic spring " passing over its centre, attached at one end, but capable of being " opened, if required, to renew the spring or otherwise. Through, " or rather under, this spring is passed the railway ticket, securing " the same between the spring and the back of the monitor. " There is also a circular hole in this outer case, through which is " seen, on removing the ticket, the number, which has been set by " the traveller, of his parcels or luggage. The work in the interior " consists simply of a cog wheel, slide and ring."

[Printed, 2½*d.*]

1853.

A.D. 1853, January 5.—N° 26.

EDWARDS, Francis.—" Transferring to enamel the impres" sions printed in suitable oils or inks, obtained from engraved " plates or by other means, to serve instead of painting such work " on the enamel by hand." The patentee transfers to enamel, impressions printed with any suitable oil on a glutinous material formed into thin sheets, by which method the groundwork of any design to be executed is at once obtained on the surface of the enamel, and such oil impression is sufficiently viscid to retain finely ground enamel or metallic oxides when dusted over it, which, adhering only to the transferred oil impression, is then ready for the customary firing process. Or by a method of charging the surface of the enamel with spirits of turpentine, printed impressions on paper, made with ink composed of a suitable oil and powdered enamel or metallic oxides, complete impressions may be transferred at once, and fired. The above may, among other things, be applied in manufacturing dials.

[Printed, 3½*d.*]

A.D. 1853, January 21.—N° 151.

KNIPSEHAAR, ABRAHAM ANTON MEIJSENHEIJM.—*Void by reason of the Patentee having neglected to file a Specification in pursuance of the conditions of the Letters Patent.* The Provisional Specification declares this invention for " An Illuminated Night " Clock" to be " a method of constructing a receptacle which, " being supplied with oil, will not only afford a night light, but " by means of certain apparatus connected with the surface of the " oil, and the hand of a dial plate to be affixed to the receptacle " itself, cause the hand as the oil is consumed to pass round the " face of the dial at an equal and measured rate, and thus denote " the time."

[Printed, 2½*d.*]

A.D. 1853, January 21.—N° 154.

NEWTON, WILLIAM EDWARD (*a communication*).—The invention consists in shewing the days of the week, and month, and year, as well as the time of day, by means of a train of wheelwork which is independent of the ordinary clockwork, and is only acted on once in 24 hours, an independent spring being adapted to actuate the mechanism. The calendar wheelwork is so arranged that the proper number of days is made in each month of the year, including leap year; and only requires winding up once a year. The above is accomplished by means of a "count wheel" operating similarly to the striking part of an ordinary clock, but having thirty-one notches, one of which it moves every day, making an exact revolution in every month, long or short; on the same arbor is a wheel with twelve divisions on its rim, six of which are notches; it also has a star wheel attached to it of twelve teeth. This wheel moves one division each month, making an entire revolution once in a year. This inside wheel of twelve teeth is so arranged that it will work upon and raise two "lifting pieces" for-the purpose of closing and opening three of the notches in the count wheel, by which means the number of notches in the count wheel always corresponds with the days of the month.

[Printed, 5½*d.*]

A.D. 1853, January 26.—N° 199.

NOLET, Charles.—*Void by reason of notice to proceed not having been given within the time prescribed by the Act.* The Provisional Specification states that "This invention consists in the " application of electric currents, which are alternately broken and " established by a prime regulating time keeper, for the actuating " of any number of separate time keepers, for the purpose of " indicating the correct time in various parts of a town or building " simultaneously. This is effected in the following manner:— " A battery is placed in connection with a regulating clock or " chronometer, and the current passes through it to a series of " other time indicators by wires laid down for the purpose. These " latter indicators may be constructed in and fitted to the ordinary " street lamps, the dials being formed on the sides of the lamps, " which may be of ground glass, so that the time may be easily " read off either at night or during the day. The mechanism for " actuating the hands of the various time indicators consists " simply of the ordinary dial wheels of a clock, for giving the two " speeds required for the hour and minute hand, and a ratchet " wheel and palls. The palls are fixed to a plate, on one end of a " vertical vibrating lever, which works on a fixed centre at its lower " extremity. This lever forms an armature to an electric magnet, " and is attached thereto whenever the current is established, and " drawn back again by a spring when the current is broken; thus " as the current is being constantly established and broken at all " the different clocks by any simple contrivance in the main or " prime regulating clock, it follows that all the different armatures " will be caused to vibrate simultaneously. This vibration gives " motion to the ratchet wheel in each indicator, by means of the " palls before mentioned, which are attached to the upper end of " each lever; in this way the ratchet wheel is moved forward one " tooth for every forward, and another tooth for every back move- " ment of the armature. Two detents are also fitted to the plate " carrying the palls, in order to take into the ratchet teeth after

" every movement, and hold the wheel steady until the next stroke " of the armature."

[Printed, 2½*d.*]

A.D. 1853, January 31.—N° 263.

BOREHAM, Samuel.—*Void by reason of notice to proceed not having been given within the time prescribed by the Act.* From the Provisional Specification it appears that the invention consists " in a new mode of constructing chronometers and watches so " that they may beat distinct seconds or half seconds, and to " strike at the minute or 60th second, so that seconds and " minutes may be counted by the ear, while the eye is otherwise " engaged, as in looking through a telescope or quadrant in " taking astronomical observations."

As the balance comes forward, the unlocking pallet acts upon the point of the discharging spring, which point rests against a pin in the lever upon which it is fixed, which prevents any motion in the said spring while being acted upon in unlocking the escapement wheel. It therefore is the same only as a point in the lever, and consequently the lever is moved, and the detent with it, and the escape wheel is unlocked. The escape wheel being unlocked gives the impulse to the balance, but while doing so the said wheel acts upon an inclined plane, which is upon the lever at the opposite end to the locking pallet. The wheel by so acting on this plane conveys the locking detent in, ready to receive and lock the tooth now become due. In this action it is assisted by a small spring, which is fixed to the arbor of the lever, and to the plate of the movement. The minute stroke is gained by having a small hammer raised by a wheel with sixty teeth, which wheel is placed upon the centre wheel of the movement, and moves round once in an hour. The hammer is thus raised by each tooth of this wheel acting upon it within the space of a minute, and the hammer thus locked upon the end of a lever. The other end of the lever is acted upon by a small pallet which is placed on the fourth or seconds wheel; and when this pallet has arrived at a given point which indicates the sixtieth second it has moved this lever sufficiently to unlock the hammer, and the hammer is immediately impelled against a bell spring by the force of a small spring acting upon it.

[Printed, 2½*d.*]

A.D. 1853, February 2.—N° 284.

SMEETON, John.—*This invention did not proceed to the Great Seal.* In his Provisional Specification the patentee says:—" My " improvements consist in making dials of glass instead of copper " or other metals, and in writing on either side the letters, figures, " characters, or designs commonly used on dials, and by my " improvements no enamel is required to be used for the faces of " dials. I take a piece of glass cut or blown to the required size, " and write in the letters, figures, characters or designs intended " on either side of the glass, but I prefer doing so on the inner " side, in which case they must be written reversed; I then place " over these letters, figures or designs a coat of composition in " imitation of enamel of any colour, such as white cream colour, " &c.; or I can imitate silver, bronze, or gold on glass dials, and " produce a good effect with great economy. When necessary to " attach or unite the glass dial so made to any other material, " such as horn, bone, ivory, or metal, an adhesive composition " must be used."

[Printed, 2½*d.*]

A.D. 1853, March 7.—N° 570.

WATSON, Joseph John William.—" Improvements in illu- " minating apparatus, and in the production of light." The improvements in the production of light consist in adapting the mixed gases, oxygen and hydrogen, as they are obtained from the decomposition of water by galvanic or other agency, to the purposes of illumination, by causing them to impinge during their ignition against certain non-combustible, or nearly non-combustible, radiating mediums. The only part of the invention that relates to clocks, is the application of apparatus moved by clock-work to impart a rotatory reciprocating and advancing motion to the radiating body, on which the flame impinges in lamps of any construction for the burning of hydrogen or oxyhydrogen gas, from whatever source obtained.

[Printed, 5½*d.*]

A.D. 1853, April 4.—N° 796.

NEWTON, William Edward (*a communication*).—1. Producing intaglio-graphic printing, and other plates, from forms of types, by surrounding the types, whilst in contact with a glass plate or its equivalent, with plaster of Paris or some other equivalent and suitable substance, so that, when set, the surface of the plaster or other material will be on the same plane with the surface of the types; after which the form of types thus surrounded may be suitably stereotyped.

2. Producing plates for embossing by taking a cast in plaster, or its equivalent, from an intaglio-graphic plate, and then stereotyping; thus producing a reverse duplicate in relief.

3. Producing "illuminated printing plates" for printing shades, intaglio-graphic letters, characters, or figures, by producing an intaglio-graphic plate, as above, and then removing the plaster; so that after printing in intaglio with the intaglio-graphic plate, the shadows can be printed either with the form of types after the plaster has been removed, or with a stereotype taken therefrom.

4. Producing poly-chromatic printing plates from an intaglio-graphic plate, by taking a cast therefrom in relief, and from such relief obtaining a " stencil plate or plates," from which the plate or plates is or are to be obtained, to have the letters, characters, or figures, in whole or in part, in duplicate, and in relief.

The above may be applied to dials.

[Printed, 7½*d.*]

A.D. 1853, April 7.—N° 840.

LE MESURIER, Frederick.—This invention consists in combining the use of two tubes on an axis; the one being inclined, and having a bulb at each end, to contain sand; the other containing a ball; and the parts being so balanced that the ball retains the apparatus from movement till the sand has run into the lower bulb, when the extra weight at that end of the apparatus causes the tube containing the ball to incline; the ball will then move, and the whole apparatus also. The invention is applicable, amongst other uses, to give notice, by the striking of an alarum, of the expiration of a given period of time.

[Printed, 4½*d.*]

A.D. 1853, May 9.—N° 1140.

QUAIFE, Thomas.—1. Forming watch cases by pressure engines, with stamps for stamping up the sides and bottoms, and the rims for holding the glass, and other rims connected with watch cases, by pressure engines, and draw plates having apertures of suitable form.

2. Forming the plate at the back of the dial by stamping and pressure, with the requisite number of bearings for the wheels and movements sunk at one operation, the opposite or top plate being formed in a similar way, with such parts as are necessary countersunk or pierced.

3. In watch movements, the patentee slits the balance staff or arbor, instead of using a hollow ruby or other jewelled roller, or in some cases he slits the jewel itself, or uses a jewelled roller, and he constructs the escape wheel so as to beat full seconds. His improved duplex escape wheel has double pointed teeth, which work either on a slit steel balance roller, or on a slit ruby roller, the opening or notch of either of which is cut just one quarter away, so as to bring the points of the wheel teeth into the centre of the staff or roller. As the last point of the double tooth escapes from the roller the impulse pallet on the balance arbor receives the impulse from the upright tooth, and thus causes the seconds hand to mark the full second at each impulse.

4. A lever escapement, which the patentee calls the "terret "lever." The teeth stand perpendicular to the face of the wheel, and work on steel or ruby pallets, which are attached at one end of the lever, one pallet projecting further from the staff than the other, and the two being placed so far apart as to allow one tooth of the wheel to pass between them, in order that when the tooth has passed down the inclined plane of the inner pallet, the coming tooth may fall upon the inverted plane of the outer pallet, and rest there until the action of the balance brings it away, when another impulse is given to the balance.

[Printed, 10½*d.*]

A.D. 1853, May 14.—N° 1199.

O'KEEFE, JOHN.—*Void by reason of the Patentee having neglected to file a Specification in pursuance of the conditions of the Letters Patent.* According to the Provisional Specification, this invention consists in "raising watch cases out of sheet metal by means of a "fly press and dies. A disc of the proper size is placed over a "female die, the interior shape of which corresponds with the

" exterior shape of one half of a case of a watch; such female die " being in two parts. Two male dies are used; the first forces the " disc of metal into the mould, and the second forces the upper " edges into the hollow annular form necessary; such male dies " being in parts."

[Printed, 2½*d.*]

A.D. 1853, May 18.—Nº 1231.

SANT, GEORGE.—Consists in " applying to the pendulum an " escapement wheel which vibrates with the pendulum, and a " tooth of the escapement wheel is allowed to escape each vibration " by means of a fixed incline and a locking pin. And in order to " give motion to the next or minute wheel the escapement wheel " on the pendulum, by a projection, releases a detent, and allows " one tooth of the next or minute wheel to move every minute, at " the same time the reaction of the detent keeps up the power to " the pendulum, and from this wheel the other motions of the " clock or time-keeper are derived."

[Printed, 5½*d.*]

A.D. 1853, June 15.—Nº 1457.

MAUREL, TIMOLÉON ZOÉ LOUIS.—" Improvements in horo- " logical alarms." The mechanism of the alarm is enclosed in a small drum of brass or other material, the top and bottom of which are hinged so that one of them opens to form a right angle, and is intended to receive a watch, while the other opens so as to form an angle of about sixty degrees, in the centre of which a clock bell is fixed. A strong brass cap crosses the drum, and is securely fixed to the sides. The connection between the alarm and the watch, which the patentee particularly claims, is effected by a slide rod, one end of which projects beyond the drum and to the other end is hung a bridge or support by means of a hinge, and this bridge, when the case is open, stands out at right angles to the cap. The bridge carries a roller and a wheel concentric with it; this wheel, which also acts as a dial plate, works by a pinion placed at the free end of the bridge, and whose pivot projects sufficiently to have riveted to it a capsule, with notches in it, in one of which lodges the minute hand of the watch placed underneath; the bridge also carries a lever, one end of which rubs against the roller, and the other presses against the ball of a rod, inside the alarm part, (which ball is to strike against the bell,) and prevents its oscillation until the roller presents its hollow part to the lever.

The patentee describes another alarm, the principal difference consisting in replacing the wheel gearing of the watch, which becomes useless, by three wheels forming a gearing amongst themselves by means of two pinions. The escapement-wheel, riveted on the axis of one of these pinions, communicates a movement of oscillation to an anchor, which transmits it to the balance by means of a forked piece, in which a pin moves, carried by a roller fixed upon the axis of the balance. The balance is furnished with a spiral spring, and the above clockwork is mounted between two plates. These plates are pierced at the centre with a hole, in which an axle rotates, the pivots of which pass rather beyond the plates, so that one serves as a centre for the barrel, and the other receives at its square end a large button, or a washer, by the aid of which, toothed on its circumference, the spring hammer is wound up.

[Printed, 8½*d.*]

A.D. 1853, June 25.—N° 1,551.

SANDOZ, Alfred (*a communication from Philipe Henri Matthey Doret*).—The invention consists in combining a compass with a fixed ring or dial marked with the hours of the day, from 4 A.M. to 8 P.M. inclusive, and with an upright split rod fixed to the dial opposite the north point on the compass, in which a piece of silk, stretched from the opposite part of the dial, is capable of being adjusted according to the quarter of the globe in which the instrument is used. The silk being adjusted, the instrument must be held perfectly horizontal, the needle must point due north, and be exposed to the sun's rays, when the shadow from the silk cord will be cast upon a figure or between two figures upon the dial, which will give the hour of the day. The instrument may be applied to any portable object.

[Printed, 6½*d.*]

A.D. 1853, July 28.—N° 1,769.

CUMMINS, Charles.—The invention relates to clock escapements, one of which consists of a wheel with a plain rim, upon which are two circles of pins. The exterior pins are placed at the points of intersection of the circumferences of semicircles formed with each of the interior pins as centre, and radius equal to the distance between two adjacent interior pins. The exterior pins should be twice the size of the interior, allowance being therefore made in fixing the positions. On an arm attached to the axis of the crutch is an adjustable roller. The distance of the crutch pivot holes from the escapement wheel pivot holes is from five eighths to an entire diameter of the wheel. The diameter of the roller is equal to the space between the interior pins. The space between the circles formed by the pins being therefore less than the diameter of the roller, will give to the roller by the rotatory motion of the wheel a revolving alternate motion, and also an oscillating motion; the latter sustains the vibration of the pendulum.

Another escapement has a wheel with only one circle of pins, there being on the arm two rollers instead of one, the upper one being acted on from the interior of the wheel, and the lower one from the exterior.

[Printed, 5½*d*.]

A.D. 1853, August 1.—N° 1788.

SMEETON, JOHN.—" Improvements in the manufacture of
" tablets and dial plates, applicable to showing the distances of
" carriages travelling, barometers, compasses, and timepieces."

1. " By forming a blank or ring of metal the required shape;
then by drawing the same through a set of steel or any metal
" tools, known as drawing-through tools; this process forms a
" curve or rim on the edge."

2. " By placing a printed satin, parchment, paper, or any elastic
" fabric over the metal plate; a die and press is then applied to
" the same, and both become united."

3. " Eylet-holes of metal, ivory, pearl, or bone are then inserted,
" to admit of the centre pinion for the hands to work upon, and
" to receive the key for winding; this having been done completes
" the tablet and dial plate."

[Printed, 2½*d*.]

A.D. 1853, August 31.—N° 2018.

MEUSNIER, GRIGNON.—*Void by reason of notice to proceed not having been given within the time prescribed by the Act.* From the

Provisional Specification it appears that the invention "relates to "improvements in the arrangement of the works of portable "clocks, and consists, firstly, in the application of the circular "escapement, whether of the duplex, cylindrical, or any other "kind, fixed on the front of a round or square movement, the "front plate of which is cut through so as to expose the escapement and a portion of the works to view. Secondly, the application of an alarm or chime, the key or arbor of the barrels of "which is placed above the circle of hours, and the construction "of the alarum simplified. Thirdly, actuating wheelwork to show "the day of the week, month, and year by means of the chime or "alarm barrel."

[Printed, 4½*d.*]

A.D. 1853, September 3.—N° 2036.

DOBELL, Ebenezer.—*Void by reason of notice to proceed not having been given within the time prescribed by the Act.* In his Provisional Specification the patentee says, "The invention relates "to so arranging parts in connection with timekeepers that a "series of such timekeepers, being connected together by an electric current, may at certain periods be set to uniform time. In "place of the minute wheel being caused to rotate by the friction "of a spring, as at present, I apply a pair of discs carrying friction "surfaces of leather or other suitable material; one of these plates "being attached to the minute wheel, the other being capable of "rotating with the 'centre wheel,' and of sliding thereon, so as to "be in friction contact with or be free of the other disc on the "minute wheel. Contact of these friction wheels is maintained "by the end of a spring lever, whose other end is capable of being "acted upon by another lever carrying a piece of soft iron placed "opposite to an electro-magnet, which, when acted upon by an "electric current, draws the piece of soft iron, by which one of the "discs may be removed from friction contact with that on the "minute wheel. The disc on the minute wheel is formed with a "triangular recess in its periphery to receive a wedge-formed piece "carried by a spring lever, so that when at any given time the "point of the recess in the disc should be exactly opposite the "point of the wedge on the spring lever, and the electro-magnet "is at such time made magnetic, the lever before mentioned, in

" connection with one of the discs, will remove that disc so as to " release the minute wheel, and the lever carrying its wedge-" shaped end will at the same time be released to fall into the " wedge-shaped recess in the minute wheel; and should a slight " variation have taken place in the time of the clock since the last " regulation this will at once be set right. Then, as soon as such " adjustment has been effected, the electric current will be broken, " and the timepiece or series of timepieces in the circuit will pro-" ceed as usual. I propose that the setting shall take place at any " given time every twelve hours. I also propose to use for this " purpose any one of a series of electric wires, used at other times for " general telegraphic purposes. And in order that the parts of the " clock may not, at times when not required, be acted upon by " the passing of electric currents for other purposes through such ' wire, I arrange the lever, in connection with the sliding friction "" disc, so that it may be capable of being acted upon only at the " times previously determined upon as those when the adjustments " shall take place."

[Printed, 2½*d.*]

A.D. 1853, September 9.—N° 2072.

RADFORD, JONAS.—The purpose of the invention is to show the time at all parts of the world at once. It is motived nearly in the usual manner, but a band or chain is introduced, on which the hours and minutes are marked, and is placed either below the clock face, or elsewhere if desirable. Under this band is the map plate, on which is a space for engraving thereon the names of cities, towns, or other designations as may be desired; below this space the map is engraved (on Mercator's projection) of the whole or any part of the world. As the usual wheelwork moves, giving on the dial the correct time of any particular place, the band is moved from right to left by wheelwork in connection therewith, and shows the time elsewhere.

[Printed, 8½*d.*]

A.D. 1853, October 26.—N° 2478.

LANE, URIAH.—*Void by reason of notice to proceed not having been given within the time prescribed by the Act.* From the Provisional Specification it appears that the invention consisted " in the

" use and application of aeriform and liquid fluids, either separately or in combination with each other, for the purpose of " measuring and indicating time;" and the patentee mentions as one mode, nearly filling a glass tube with fluid, and, when the tube is placed slightly out of the horizontal, employing the upward motion of the air bubble within the tube, as a measure of time. As another mode, he mentions a syphon, one leg whereof is fixed to a float placed in a reservoir of water, and the other leg is open to the atmosphere; the size of the bore being such as to admit of one drop of water being discharged at a time. Equal quantities will thus be discharged in equal times, by reason of the pressure of the float on the surface of the water being always the same.

[Printed, 2½*d.*]

A.D. 1853, October 27.—N° 2486.

DERING, George Edward.—" Improvements in galvanic " batteries." 1. The use of acid solutions in contact with the negative elements of batteries having any suitable exciting liquids not composed of free mineral acids applied to their positive elements.

2. The application of porous divisions of earthenware or other material to troughs, or cells, or vessels, wholly or partly constructed of gutta percha, or india-rubber, or like materials, or compounds containing such materials.

3. The use of lead as a negative element with any suitable positive element, and any suitable exciting liquid or liquids, in batteries for working electric telegraphs or clocks.

4. The use of iron as a positive element with any suitable negative element, and any suitable exciting liquid or liquids, in batteries for working electric telegraphs or clocks.

5. Rendering air-tight by any suitable means batteries employed for working electric telegraphs.

[Printed, 3½*d.*]

1854.

A.D. 1854, January 7.—N° 300.

DURILLIER, Alphonse François Damiens.—" A new " system of remontoirs or apparatus for winding up watches " without a key." The invention consists in the application of a clutch box or otherwise striated wheel, to the spindle of the remontoir, for the purpose of winding up the watch by applying one finger to the said wheel, and then turning the watch in the direction required as is done with keys. A similar fluted or striated wheel is fixed in the arbor of the watch hands. The arbors may be either with or without a hollow or solid square for using common keys if required.

[Printed, 5*d.*]

A.D. 1854, February 24.—N° 453.

POWER, Edward, and KNOWLES, Thomas.—*This invention received Provisional Protection, but notice to proceed with application for Letters Patent was not given within the time prescribed by the Act.* The Provisional Specification states:—" The object of " these improvements is to remedy the evils arising from over " winding watches and spring clocks, or from endeavouring to " wind them the wrong way. The invention consists in substi- " tuting a loose arbor for the fusee instead of a fixed one, which " arbor has a small ratchet catch and spring placed between the " top of the fusee and the fusee cap; the fusee cap being screwed " on instead of soldered. When the chain is fully wound up it " pushes in a small catch under the fusee cap, which throws the " arbor out of action, making it turn independently of the fusee."

[Printed, 3*d.*]

A.D. 1854, March 9.—N° 571.

TROTMAN, Sanders.—The combination of a night-light with a dial illuminated thereby in front, in place of a transparent dial with a light behind it. The hour disc is made to revolve, and there is a fixed index to mark the time. The light is so placed as to throw the strongest light on the figure pointed to by the index. If the night clock is furnished with an alarum, suitable perforations are made in the revolving hour disc, to show the alarum dial through it.

[Printed, 6*d.*]

A.D. 1854, March 10.—N° 573.

PEACE, William.—"Improvements in machinery for measuring, " indicating, and registering the flow of air, gas, and other liquids, " and for governing the speed of steam or other engines." The air, gas, or other liquid, the flow of which is to be measured and indicated, is made to "impinge against a body suspended to a " balanced beam." The action of the current on this suspended body depresses more or less the end of the beam to which it is suspended, so as to move a pointer attached to the centre thereof, thereby indicating the strength of the current. The registering is effected by means of a marker attached to the pointer, which marker is held in contact with the circumference of a cylinder, round which is wound paper, or other suitable material, divided into intervals of hours or otherwise. The cylinder is moved by clockwork.

[Printed, 7*d.*]

A.D. 1854, May 30.—N° 1195.

HEINHOLD, Edouard.—*This invention did not proceed to the Great Seal.* From the Provisional Specification it appears that the invention for " Improvements in diurnal and nocturnal indicating " apparatus " consisted so far as clocks are concerned in mounting two dials concentrically on two shafts or drums turning one within the other, set in motion by suitable clock-work. The dials are covered with an opaque plate, having a hole for each dial; one to indicate the hours, and the other the minutes, the figures being fixed on transparent plates. " For illuminations dull ground glass " cylinders are used to moderate the light, also double concentric " glass cylinders, the space between the two being closed at the " bottom, and filled with a suitable colouring liquid, and the " internal space being lighted up."

[Printed 3*d.*]

A.D. 1854, June 3.—N° 1240.

CHAVANES, Antoine (*a communication*).—The object of this invention is to register, by self-acting means, the length of time a public carriage is occupied, and also to show, by means of a plate raised and lowered by self-acting means, and visible from the outside of the carriage, whether the carriage is or is not engaged. The apparatus consists partly of a clock with two faces, one on the front, on which the time is indicated by hands in the usual manner, and the other at the back, and consisting of a disc which revolves once in 24 hours, and has the hours marked on it accordingly. There are two hands, each bearing a tracer, and according as one or the other is brought into contact with this dial it will be marked thereby. When the apparatus is not in action one of the hands marks, but when the seat of the carriage is occupied, the other hand or marker is brought into action by means of a lever and cords in connection with the seats of the carriage.

[Printed, 9*d.*]

A.D. 1854, June 19.—N° 1332.

WEBER, Joseph Valentin.—The application of a second or "winding-up" main-spring, so that the main-spring in immediate connection with the going works is maintained at a uniform tension.

[Printed, 6*d.*]

A.D. 1854, June 22.—N° 1373.

SMITH, Ephraim.—The invention is an improvement on Breguet keys, and consists in enabling the key to be turned from left to right, or vice versâ. Upon the upper part of the key shaft is a toothed wheel, which is placed inside a small box. A paul or catch, having both ends alike, and turning in a centre, is made so that either end will take into the teeth of the wheel, the paul being reversed by means of a spring or other suitable contrivance.

[Printed, 5*d.*]

A.D. 1854, August 18.—N° 1804.

BAKER, William.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent*

was not given within the time prescribed by the Act. The invention relates to the making of bezils or rings to hold the glasses of dials. A strip of sheet metal is bent into a hooplike form, and the ends soldered together. The hoop is then placed on a chuck in a lathe, and burnished or spun into the required shape.

[Printed, 3*d.*]

A.D. 1854, September 13.—N° 1990.

BELLFORD, Auguste Edouard Loradoux (*a communication*).—Improvements in "electro-magnetic clocks." "The prime " mover of this system of electric clocks is electricity, which acts " by means of a pendulum, whose vibrations are kept up by an " escapement of constant strength." Two coils are used, and are furnished with wire covered with silk. When the electricity is conducted by these coils, it magnetizes the pieces of iron placed in the centre of each coil, which are secured to a cross bar. Any battery is employed and acts by means of two conducting wires, one of which, proceeding from the positive pole, conducts the electric current to the first coil; the other, proceeding from the negative pole, conducts the electric fluid to the second coil, after having passed through a support, mounted on ivory, so as to insulate it from the rest of the mechanism. The two rods in the centre of the two coils thus acquire the power of attracting another piece of iron, having a vertical branch; this piece of iron has an oscillating motion between two points, forming pivots, so that it can move freely, and when not attracted by electricity, gives way to the attraction of a spring. In order to effect this, one pole must be insulated. In order to obtain this oscillating movement in a regular manner, a pendulum is used. On giving this pendulum an impetus, it touches on the right, a very slight spring, fixed to the support mounted on ivory, as before mentioned. This support receives one of the two conducting wires, and conducts the electricity to the upper only of the coils, demagnetizing the central bar, allowing the iron piece to be drawn back to its place by the said spring; the pendulum in returning breaks contact with the spring, and thus the electric current passes freely along its conducting wire to arrive at the second coil, which causes the central bar to be magnetized again, and to attract the iron piece again; this to and fro motion continues as long as the pendulum vibrates. To keep up the vibrations of the pendulum, there is a repose scapement, which receives its impetus from a spiral spring, one end of which is fixed to the escapement ratchet or wheel, and the other end to another ratchet wheel mounted so as to turn loose on the arbor of the escapement wheel.

[Printed, 10*d.*]

A.D. 1854, September 20.—N° 2029.

PIERRET, Victor Athanase.—Relates to mechanism to be applied to watches and clocks to indicate the month, the day of the month, and the day of the week. In the ordinary dial plate are three openings, and at the back thereof, upon the arbor which carries the hour hand, is placed loosely a dial with numeral figures from 1 to 31 marked on, to represent the days of the month. This dial is connected to a ratchet wheel with 31 teeth. Towards the left hand, is a dial, divided into seven, and marked to represent the days of the week, and towards the right hand a dial, divided into twelve, and marked to represent the months. These dials are connected respectively with ratchet wheels of 7 and 12 teeth respectively. In gear with the pinion of the hour wheel is a spur wheel, having twice the number of teeth that the hour wheel has. Upon the arbor of the hour wheel is a snail, which is driven by a pin therein, taking into a slot in the wheel. This snail acts upon a friction roller upon a detent, which has two arms, one of which acts against the ratchet wheel of thirty one teeth, and the other against that of seven teeth. Each time that the hour wheel makes two revolutions (*i.e.*, once in 24 hours,) the snail revolves once, and the two arms of the detent each take one tooth of their respective wheels, and thus alter the days of the month and week. The dial which indicates the calendar month is actuated each month by hand by means of a small lever.

[Printed, 6*d.*]

A.D. 1854, November 1.—N° 2320.

BRADSHAW, James, and BRADSHAW, William.—The invention consists in ;—1. The use of a simple lever, instead of the ordinary spring-holder or detent spring, the object being to dispense with the slender part of the detent. The lever is of the same strength from end to end, and is worked on by a spring, so that, during the movement of the escape wheel, its action is the same as that of the usual spring holder.

2. "Causing an independent dead or full seconds and half " seconds to beat from the one train, thus dispensing with the " ordinary plan of independent trains." The patentee effects this in various ways, such as, " by raising the hand and boss, on which " it is fitted tight, off the seconds pivot," or the same object may be obtained " by means of a small cross-cut, grooved, or chased " plate with its corresponding one fitting tight on the seconds " pivot," or " by means of a pinion working in the third wheel " which pinion works upon the centre," and is raised by levers.

[Printed, 5*d.*]

A.D. 1854, November 9.—N° 2381.

TUNKS, DAVID.—The substitution of a worm or spiral, instead of a pinion, for giving motion from one wheel to another in all clocks, watches, and timepieces.

[Printed, 5*d.*]

1855.

A.D. 1855, January 16.—N° 109.

CHOISNET, URBAIN CHARLES, and GIAJOLA, CHARLES EMILE.—1. Consists in making a moderateur lamp capable of burning eighteen hours without being rewound.

2. Affixing to a moderateur lamp a dial on which the time is indicated by fingers moved by the descent of the piston of the lamp. A rack fixed on the piston, engages in a pinion, and as the piston descends, the rack is carried with it, and gives motion to the pinion, which motion is transmitted through a series of toothed wheels to the dial. The pinion is not fixed on its axis, but is connected thereto by means of a ratchet wheel and click, in order that when the rack rises during the winding up of the lamp, a backward motion is not transmitted to the hands of the dial.

[Printed, 10*d.*]

A.D. 1855, April 19.—N° 875.

JOHNSON, John Henry (*a communication*).—" Improvements " in the manufacture of articles of hard India-rubber or gutta- " percha, or compounds thereof, and in coating or covering articles " with the like materials." The invention consists in the manufacture of various articles, one of which is "clocks," of India-rubber, gutta-percha, or compounds thereof, "by first moulding " them while in a soft state, and then submitting them to a high " degree of heat in steam heaters or to the action of a sulphur " bath. The moulds may sometimes be composed of plaster, but " it is preferred to make them of porcelain, glass, metal, or gutta- " percha. In some cases it is proposed to form the article of the " compound in a plastic state, and then submit it to the action of " heat after being removed from the mould; or the article may " be submitted to the heating process while still in the mould. " During the process of vulcanizing, the article may be imbedded " in magnesia, which is preferable to soap-stone or plaster, since " these materials bleach the articles during the process of vulcan- " ization, whilst the magnesia allows them to come out of the " mould quite black."

[Printed, 4*d.*]

A.D. 1855, May 21.—N° 1150.

NEWTON, Alfred Vincent (*a communication*).—Relates to the employment of permanently attached mechanism as a substitute for watch keys. Two folding leaves are attached to the back of the watch case, one of which fits upon the fusee post and serves to wind up the watch, and the other fits upon the centre post and serves to move the hands. The leaves can be raised up when it is desired to wind up or set the watch, and afterwards closed down on the case again, by means of a hinge. The invention is applicable to watches with single or double cases, and the connection of the folding leaf with the fusee is effected by a clutch-box or a ratchet-wheel and click arrangement; the object being to prevent injury to the watch by turning the fusee in the wrong direction. The clutch-box is formed of two clutch wheels which are kept out of gear by a spring. To wind up the watch, the leaf must be

raised and pressed in, so as to overcome the resistance of this spring, and must then be turned as a key.

[Printed, 7*d.*]

A.D. 1855, May 25.—N° 1189.

JACCARD, Auguste Paillard (*a communication*).—*This Invention did not proceed to the Great Seal.* From the Provisional Specification it appears that the invention "relates to a novel
" arrangement of parts for driving the central seconds hand. The
" spindle of the seconds hand receives its motion from the fourth
" wheel by means of a pressure spring that drives it by friction of
" contact. On the top of the arbor of the fourth wheel a spur-
" wheel is loosely mounted. The boss of this wheel is made
" hollow to receive a coiled spring, which is fixed to the arbor of
" the fourth wheel, and presses against the inner periphery of the
" boss; a cap, which covers the boss, carries the central spindle
" for the seconds hand, and the continuous rotary motion which
" the fourth wheel is calculated to impart to the wheel with the
" hollow boss is converted in the usual way into a motion by pul-
" sations. When a stop is put upon the rotation of the seconds
" hand and its wheel, the spring in the hollow boss will yield, and,
" sliding round in the boss, permit of the continued action of the
" other parts of the watch."

[Printed, 3*d.*]

A.D. 1855, June 25.—N° 1452.

POOLE, Moses (*a communication*).—" An improvement in sculp-
" turing surfaces of marble and stone." The invention consists in " rolling or rocking an engraved or embossed metallic surface
" in contact with a surface of marble or wood, sand or other
" suitable cutting material being interposed between the metallic
" surface and the wood or stone to be operated upon, whereby the
" latter is ground or cut away, and an exact counterpart of the
" metallic embossed surface is produced." The above may be employed to emboss the pillars of clocks.

[Printed, 6*d.*]

A.D. 1855, July 11.—N° 1554.

ADAMS, John.—"Apparatus to indicate the time when persons " commence and leave their work." A series of cells or chambers are caused to revolve by clockwork, and are thus brought successively under the end of a tube, connected with the box in which the cells are enclosed, so that a ticket being dropped down the tube and falling into one of the cells, will register the time when it was dropped in. In some cases, in place of making the chambers or cells to revolve, the patentee connects "the descending tube " with the clockwork," and thus delivers the card or ticket into the cell.

[Printed, 6*d.*]

A.D. 1855, August 4.—N° 1769.

PERROT, Henri Louis Racine.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* In his Provisional Specification the patentee says: "I propose " instead of the escapement now ordinarily used in chronometers " to substitute a more simple one. The wheel will rest on a ruby " roller larger in size than the roller of a duplex escapement; this " roller will be flattened on one portion of its periphery. On the " axis roller will be placed a small piece of steel, indented up to " about one-fourth of its superfice. On the same axis will be fitted " a small arm projecting on one side in the direction of the balance " axis. The principal novelty will be a spring carrying a head at " the extremity of its slight blade, which head projects laterally " and sideways, and is split horizontally to hold a ruby stone, " which is made to turn on a pivot fixed in the centre of the " head aforesaid. The action of the escapement will be as follows: " The balance axis will have (like the chronometer) the large " impulse and small detached levers. In moving the balance " to the left the detached lever lifts the arm of the rest; the wheel " leaving the circular portion of the roller passes over (without " touching) the flat portion thereof, and falls on the impulse lever; " by the action of the spring the moveable ruby is made to rest " in the indentation aforesaid, so that when the arm is moved

" either way it returns to its centre. In moving the balance to " the right the wheel takes more rest than the roller."

[Printed, 3*d.*]

A.D. 1855, September 8.—N° 2042.

WEBSTER, Henry.—The object of the invention is to give a means of readily detaching the escapement from the train of wheelwork in timekeepers. This is effected by the application of one or more moveable plate or plates to the pillar plate, the escapement movement being attached to the moveable parts.

[Printed, 5*d.*]

A.D. 1855, September 26.—N° 2144.

HUGUENIN, Gustavus.—The invention relates to apparatus to wind up and set the hands of watches and other time-keepers. The pendant is traversed by a pinion, the spindle of which terminates in a knob so as to be easily turned by the hand; and the lower part adjusts itself to a wheel furnished with a double set of teeth, one set taking into and receiving motion from the pinion, whilst the other set acts upon the barrel wheel through the intervention of a coupling wheel or other suitable mechanism, so as to wind up the timekeeper, or may be brought to bear upon the minute wheel through similar mechanism, for the purpose of setting the hands, the said double-toothed wheel being detached from the barrel wheel and being brought to bear upon the minute wheel through the medium of a moveable bridge, which is attached to the axis of the double-toothed wheel, and is acted on by a knob or stud on the outside of the case.

[Printed, 5*d.*]

A.D. 1855, October 20.—N° 2356.

GANDIBERT, Hypolyte.—*Void by reason of the Patentee having neglected to file a Specification in pursuance of the conditions of the Letters Patent.* From the Provisional Specification it appears that this invention for " An improved construction of guard " for preventing surreptitious removal of watches, purses, pocket " books, and other articles from the person " consisted in connecting to one end of a small chain " a spring loop or suspender, " and to the other end a sharp pointed hook, or its equivalent,

" which will enter with facility the fabric of which the pocket is " composed, and take a firm hold thereof."

[Printed, 3*d.*]

A.D. 1855, October 25.—N° 2390.

ROBINSON, JOSEPH.—The invention relates principally to timepieces which are covered by glass shades, and consists in so arranging them that they may be wound up without removing the shades. " The arbor or axis, which is usually made square to " receive the key, has a toothed wheel fastened on it, into which " another toothed wheel mounted on a vertical axis gears. At the " lower end of this axis is fixed another wheel, which gears with a " fourth on a horizontal axis, which projects through the stand, " and has a knob or handle fixed on it, by which the clock is " wound up, or it may be made suitable to receive a key of the " ordinary description."

[Printed, 9*d.*]

A.D. 1855, November 1.—N° 2438.

NICOLE, DAVID LOUIS ANTOINE.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* From the Provisional Specification it appears that this invention for " Improvements in apparatus for winding up watches " consisted in applying a toothed wheel to the inner case, or cap, or plate of a watch, in such manner that it would be made to rotate by a toothed wheel fixed on the stem of the knob, or on a spindle passing through the knob. By another wheel gearing into the toothed wheel motion was to be given to wind up the watch, and by another wheel also gearing into the toothed wheel, motion was to be given to set the hands, " such last-mentioned gearing being " kept out of action, except when it is required to set the hands of " the watch."

[Printed, 3*d.*]

A.D. 1855, November 3.—N° 2466.

GARDNER, WILLIAM.—" An improved method of manufacturing " watches or other timekeepers, and also improvements in the " machinery, tools, or apparatus for accomplishing the same."

This improved method consists in " making certain principal separate parts of the same; that is, 'the plates' of one equal and " fixed size and form for each series." This is accomplished by certain novel tools or apparatus, first of which is that required to regulate the piercing or perforating the "plates," so that the distances required between the several holes for the reception of the various pivots, steady pins, and screws shall be invariably the same, and consequently the depth of the gearing of the several wheels and pinions of the mechanism the same and in accurate positions. Upon the chuck of a watchmaker's ordinary lathe is placed a steel guage, die, or face plate, which is secured upon the chuck by means of clamps or by three small bent arms, retained in their position by bands of vulcanized india-rubber secured (but having a sliding motion) to the back of and passing through the slotted arms of the chuck. Through the gauge plate or face plate are drilled in their proper places all such holes as are required for the reception or bearings of the various pillars, pivots, steady pins, and screws. On the face plate of this die are two spring clamps, furnished with screws, for the purpose of securing upon the die, and two side springs, to assist in the true adjustment of, the blank " watch plates." " The blank watch plate may now be secured " upon the die, the centre of the die resting immediately over the " ordinary central pin or pivot running through the mandril or " shaft of the 'chuck.' If it be desired to drill a central hole " through the watch plate it is simply necessary to advance the " drill, which is fixed in a triangular rod, which rod is capable of " being moved upon the top of the rest of the lathe, and the " desired perforation takes place. If it be now desired to drill the " hole for the reception of one of the 'pillars,' or any other of the " various holes of the 'watch plates,' the die must be raised from " the face of the 'chuck,' and such corresponding hole (already " drilled upon the die or face plate) placed over the central pin or " pivot of the chuck, which pivot is forced against the back of the " face plate by means of a spring enclosed in the lathe spindle. " By this means, when the pivot comes opposite to a hole in the " face plate or die it is forced through, thus determining the centre " of the hole to be drilled in the 'watch plate,' which will correspond in situation to the one already formed in the die. The " 'slide rest' with the drilling or turning tool has now to be " advanced, and the desired hole will be perforated."

The improvements further consist of apparatus to be applied to the ordinary lathe as an indicator, for the purpose of accurately showing the thickness and diameters of the plates, and the depths of the recesses turned or formed therein. This indicator consists of a small case or box, the upper plate of which has one or more dials and indices, for the purpose of registering and indicating the depth of the cut or drill of the tool. Within the box is a rack (sustained in position or pressed outwards by a spring), the prolongation of which forms a projecting piece of metal or finger extending beyond the interior of the case. Gearing into the rack is a pinion, which is actuated by the projecting finger; this pinion is in connexion with the gearing for working the indicating fingers of whichever indices may be employed. The indicator is to be fixed upon the bed of the lathe in such a position that the finger will press against the slide rest, and when the slide rest is in motion it will release the rack, and allow the indicating fingers to move forward, thus showing when the proper depth has been obtained. Other indicators are also used; one, affixed to the chuck, to ascertain the position of the tool in the lathe, so that the operator may see when the watch plate is formed to its required thickness; another, fixed upon the bed of the upper sliding portion of the slide rest, by which the diameter of the plate is regulated.

[Printed, 9*d.*]

A.D. 1855, November 20.—N° 2617.

WHITEHOUSE, Edward Orange Wildman.—" Improve-" ments in electro-telegraphic apparatus, parts of which are also " applicable to other purposes." The invention relates to the following:—1. " The apparatus employed in obtaining electric " currents by induction, and which may be termed induction " coils."

2. "The instruments or 'relays' used for receiving alternating " currents."

3. "The combining a dead beat magnetic needle instrument " with a relay fitted to receive alternating currents."

4. "The adaptation to ordinary step-by-step action dial instru-" ment" of a peculiar "releasing or retrograde movement," which is thus described;—" The axis of the hand or pointer consists of " two parts, one of which revolves uniformly in the same direction

" as it is impelled by the train of wheels, and the other part, " which is tubular, and plays loosely upon this, carries the hand." During the forward progress of the hand, the two parts of the axis are held together by " the attractive action of the prolonged poles " of an electro-magnet," which is called the "holding" magnet, " upon the iron of the moveable part, but when the hand has " arrived at the desired letter or figure the current of electricity " from the local battery is diverted from the 'holding' magnet" to another electro-magnet, which is termed the "releasing" magnet, "and the prolonged poles of this magnet draw forward " the moveable part of the axis so as to release it from the other " portion, and immediately the magnetism of the shorter and " thicker parts of the poles acts upon a small piece of iron affixed " to a toothed segment, which gears into a pinion on the moveable " parts of the axis, and by causing such piece of iron to move " into an axial position between the poles, thereby (through the " segment and pinion) returns the hand to its starting point." The electric current is then again changed from the releasing to the holding magnet, in order that the hand may be again carried forward by the action of the relay and train of wheels.

The escape of each tooth in the step-by-step dial movement is effected "by the action of a relay, which, calling into play a local " battery, excites alternately the opposite limbs of an electro- " magnet, and thus each pole is made to attract in succession the " tail of a magnetized lever placed between them, and which in " each movement permits the escape of a single tooth of the " pallet wheel, while at the same time by the force with which it is " held, it effectually prevents the escape of more than one tooth at " a time."

[Printed, 11*d.*]

A.D. 1855, November 30.—N° 2702.

JOHNSON, Edward Daniel.—This invention for "an improve- " ment in the construction of attachable seconds watches" relates to mechanism for the purpose of putting a centre seconds hand in and out of action. The seconds hand is fixed to a loose spindle, which is set above the arbor of the centre seconds wheel, and rests upon that arbor as on a step; keyed to this spindle is a cross bar, at each end of which is a "crescent spring." The free extremities of these springs are bent round at an angle, and present a forked termination to the "chamfered edge of a disc" which is fixed to and rotates with the centre seconds arbor. The chamfered edge is roughened or milled to receive the forked ends. Beneath these crescent springs is an annular spring lever, which presses against the under surface of them in order to keep their free ends out of contact with the disc. When it is required to give motion to the seconds hand, this spring lever is depressed by means of a lever, which is acted upon by pushing in a stop that passes through the pendant.

[Printed, 6*d.*]

1856.

A.D. 1856, January 5.—N° 45.

KAMMERER, Raymond, and **BREWER,** Charles.—*This invention did not proceed to the Great Seal.* The Provisional Specification declares the nature of the invention to be as follows :—
" At the back of the dial plate are secured two pieces of glass, to
" which are fixed two ordinary electro-magnets consisting of four
" reels, upon which are wound lengths of metal wire covered with
" silk; in the centre of each of these reels is placed a bar or core
" of soft iron; each pair of these cores are connected at one side
" by a bar of iron. The electro-magnets are placed opposite each
" other upon the glass plates, the free ends of the iron cores being
" placed sufficiently apart to allow the pendulum to oscillate
" between them, the distance being regulated by adjusting screws.
" To the pendulum of the clock is attached a piece of magnetized
" metal, which is alternately attracted and repulsed by the cores
" of the electro-magnets, when the wires of the reels are connected
" with a battery. The pendulum is connected to the escapement,
" by which the hands of the clock are put in motion; the ratchet
" wheel of the escapement may be actuated either by an 'anchor,'
" or by two pauls pressing upon the teeth of the wheel. In order to

" change the current of electricity from the positive to the negative " pole and vice versâ, a small cylinder of ivory is placed upon the " arbor or axis of the escapement wheel; at each end of the ivory " cylinder is fitted a small disc of brass, having two narrow slips " of the same metal projecting from each. The discs are fitted to " the ends of the ivory cylinder, so that the projecting slips of " metal are equi-distant. Two light springs, to which the wires " of the battery are attached, press upon the discs; two other " springs connected with the clock are fitted to press alternately " upon the slips of metal projecting from the discs; as the ivory " cylinder rotates with the axle of the wheel, the contact is " alternately made and broken and the current reversed. The " clock may be actuated either by plates of metal buried in the " earth, or by a sustaining galvanic battery."

[Printed, 3*d*,]

A.D. 1856, January 8.—N° 62.

STUART, HENRY, and PRITCHARD, THOMAS.—The invention relates to the escapement. The frame of the pallet is an oblong piece of steel, (the pallet being in the form of a triangle, and jewelled in the ordinary way), a hole being drilled equidistant from each end to admit the pallet staff. The lever is oblong, and filed down on the top side so as to leave a boss on one end, and a hole is drilled parallel with the upper surface to contain the feather spring. At the other end is a fork, with a hole in which is a setting pin, perpendicular with the upper surface of the lever, and at the same end are two other pins, one of which strengthens the feather spring to enable it to throw the pallet off the set, and the other forms a bridge to keep it in its proper position. The balance staff roller is circular, with two inclined planes cut from the edge, so as to form a triangular notch about the centre, on one side of which is drilled a hole to admit of the pin. "The pallet wheel " receives its impulse from the spring in the usual way, and when " the wheel rests upon the pallet the escapement is on the set, " which is thrown off by the vibration of the balance, and the " roller pin coming in contact with the feather spring takes the " lever and pallet along with it until the pallet wheel tooth " escapes from the receiving pallet on to the impulse pallet, thus " giving a direct and continuous impulse to the balance almost

" equal to the distance between the ends of the pallet wheel teeth; " but before the tooth of the wheel has completed its distance the " roller pin will have escaped from the feather spring, and the inclined plane of the roller coming in contact with the setting pin " of the lever will have thrown the pallet back to its proper " position to receive the tooth of the wheel, thus giving the dead " beat to the escapement, and that only giving one motion of the " pallet wheel tooth to every vibration of the balance." To obtain the full seconds beat recourse is had to "an extra fourth pinion " with half the number of leaves the one attached to the fourth " wheel has, so that the drop of the smaller pinion is twice the " distance of the larger one." There is a complete vibration of the balance every second.

[Printed, 4*d*.]

A.D. 1856, January 14.—N° 103.

ULRICH, JOHN GOTTLIEB.—"Improvements in chronometers " and other time-keepers," consisting of;—1. "Improvements in " what are commonly known as compensation curbs, and other " contrivances, for effecting a compensation for change of temperature." Tubes of brass, with intermediate ones of steel, iron, or platina, alternately inclosed in each other, are placed upon a moveable plate of steel, concentric with the balance axis.

2. "Contrivances for facilitating the equalizing of the vibrations " of the balance, or rendering balance springs isochronous." To make the long and short vibrations performed in the same space of time, an epycycloidal piece is screwed as close as possible to the balance spring at the stud, and reduced in thickness at the root to render it flexible. This is "for allowing the balance " spring to lean against as it opens, to enable it to exert greater " power upon the balance as the balance increases in its vibrations."

3. "Improvements in the compensation balance of the ordinary " construction, for making it useful for every change of temperature from zero to 130° of Fahrenheit, and destroying its tendency " to being affected by terrestrial magnetism, or local attraction." Portions of a circle of two metals united, silver or brass, or aluminium or palladium, are placed in a vertical position on the laminæ of the balance. Each circle contains a screw of platina. Upon an increase of temperature this screw has two motions, one

towards the centre of the balance axis, and the other towards the end of the laminæ on which it is fixed.

4. "Contrivances for suspending the chronometers in gymbals, "upon double universal joints." These joints are made with cups and points or pivots.

5. "Improved bolts or stays for securing the chronometer when "being carried." Two notches are made "for the bolt to be "alternately placed in, similar to what is commonly known as the "bayonet lock, and to be preserved from getting out of this notch "by a spring, which is continually pressing against it."

6. "Contrivances for preventing the detent of the usual detached "escapement from the concussion which usually takes place in "coming to its banking screw," consisting of a tooth whereby the detent, as soon as it is liberated from the front surface of the tooth, is carried up an inclined plane, and as the wheel proceeds slips down gradually at the back until it rests against the banking.

7. "Improvements upon the lever escapement for reducing the "amount of friction in unlocking and receiving of impulse, and "in the guard for the prevention of tripping," consisting in making a separate roller on the balance axis, of the same diameter as the unlocking pins, those pins being at such a distance from each other, that the unlocking may take place as near as possible to the line of centres between the balance axis and the detent pivots.

8. Improvements on "remontoire escapements." The escape wheel raises alternately two levers which carry weights whereby impulse is given to the pendulum. A lever with a pair of pallets stops the rotation of the fly connected with the escape wheel, and which is liberated by means of arms of the aforesaid levers alternately raising one of the weights from the pallet lever, and thereby allowing the remaining weight to alter the position of the pallets, which enables the fly to move half round, and the escape wheel then raises the other weight to give the succeeding impulse to the pendulum. There are two detents to prevent tripping, which are drawn away from the pallets by arms fixed on the aforesaid levers, just before the pendulum receives its impulse. The patentee describes another escapement, the leading feature of which is that the impulse is given to the pendulum "as near "as possible when it is passing the quiescent point." The rotation of the fly is stopped by an arm alternately resting on

one of two pallets, and unlocked by a pin at the bottom of the pendulum entering into the fork of a lever, and directly that one of the pallets at the other end of the lever is removed from the fly, one of the impulse levers gives impulse to the pendulum.

9. "Improvements upon the compensation pendulum, and other "kinds of compensation for clocks and regulators, instead of a "compensation pendulum." The suspension spring of the pendulum passes (moderately freely) through a brass frame, and is supported by a lever, which is acted upon by other levers in connection with a tube or tubes fixed at the lower end or ends to an iron plate, and the compensation being effected by the tubes being of metal more expanding than iron, and by acting on the levers, raising the pendulum to "a greater height for any given "change of temperature to heat than what it would be lowered "for the same quantity to cold." A further improvement under this head is as follows:—As the raising the ball (or column of mercury) of a pendulum any given quantity, will not make so much alteration in the times of its vibration as lowering it the same quantity, there arises the expediency of making the centre of gravity rise in an accelerated proportion upon an increase, and to descend in a diminished proportion upon a decrease of temperature. "To effect this, a cone or a solid (generated by the "revolution of a geometrical curve) attached to a silver tube is "immersed in mercury. By an increase of temperature, the silver "tube expands downwards, and being fixed at one end, the solid "is immersed to a greater depth in the mercury, which consequently "rises in the glass cylinder in a ratio dependant on the form of the "solid."

[Printed, 1*s*. 6*d*.]

A.D. 1856, January 24.—N° 186.

RICHOUX, Louis Antoine Romain.—*This Invention did not proceed to the Great Seal.* From the Provisional Specification it appears that the object was to cause clocks to "repeat the hour "immediately after striking the half hour," which was to be effected by a lever impelled by a stud projecting from the face of the minute wheel.

[Printed, 5*d*.]

A.D. 1856, March 27.—N° 730.

TOLHAUSEN, Alexandre (*a communication from Jacob Muma*).—1. An escape wheel, to which two balances are applied, to the staff of each of which is applied a segment of a cylinder concentric with its respective balance. Each balance receives in its turn an impulse from the escape wheel working across the chord of its cylindrical segment, and gives motion to its fellow by means of very fine teeth cut in their periphery.

2. A device for compensating for the variations of the balance, which is applied to each balance, and consists of a stout ring of brass surrounded by a closely fitting coil of spring steel, one end of which is secured to the ring, and the other end is forked to receive and form a curb to the hair spring.

3. The chain is made to draw on the same side of the fusee as that from which the power is transmitted by the fusee wheel to the centre pinion. This involves the arrangement of the coil of the main spring in the reverse direction, and the consequent revolution of the barrel in the reverse direction. The smaller end of the fusee is placed next to the fusee wheel, instead of the larger end.

[Printed, 7*d.*]

A.D. 1856, April 17.—N° 917.

MESURE, Lianna.—The invention relates to making watches go for eight days, and consists in fixing on the spring barrel " a wheel of sixty or more teeth, to work on a pinion fixed on the " axis of what " the patentee calls " the eight-day wheel of " seventy or more teeth, which works the centre wheel." The fusee and chain are dispensed with.

[Printed, 3*d.*]

A.D. 1856, May 9.—N° 1096.

JOHNSON, Edward Daniel.—The object of this invention, for " An improved mode of mounting marine chronometers," is to neutralize any magnetic polarity in the balance of marine chronometers. The chronometer is made to revolve slowly on its own vertical axis. It is mounted on gimbals connected with a brass ring that rests upon rollers. These rollers turn on spindles fixed to the box, and one of them carries a spring barrel and a toothed wheel which gears into and drives a pinion, and an arrangement of wheelwork, similar to the movement of a watch.

[Printed, 5*d*.]

A. D. 1856, May 22.—N° 1222.

TOLHAUSEN, ALEXANDRE (*a communication from Yves Marie Thomas*).—Relates, 1. To a pendulum, which is composed of a vertical column and of two inclined arms which will slide up and down the vertical column. The inclined arms form two sides of a triangle whose base is formed by a horizontal cross bar. At the extremity of each arm is a weight. These weights may be raised and lowered by means of a regulating screw on the vertical column, and screws at the ends of the weights themselves. Expansion and contraction acting equally upon the metals of the different parts of the pendulum, a constant compensation is effected.

2. To an escapement, which may be applied underneath, as well as above the part described above, and is composed "of a sharp "beviled anchor, suspended on two steel pivots, and of a wheel "with salient beviled lifters," which "allow the anchor to travel "without any hindrance over an extensive circle of repose or "dead-beat." The clockwork with the said pendulum and escapement is calculated to go 504 days.

3. To calendar work which indicates "the date of the month, "the common and bissextile years, the months of 28, 29, 30, and "31 days. The handle, after having indicated the 28 Feb. in a "common year, moves back to mark 1 on the following day. "The annual wheel has only one more tooth every four years "for bissextile years. The said calendar work has its own "motive-weight, which descends only two-fifths of an inch every "year. This calendar work is not intended to be applied to "common clocks."

[Printed, 6*d*.]

A.D. 1856, July 23.—N° 1751.

DETOUCHE, CONSTANTIN LOUIS and HOUDIN, JEAN JACQUES EMILE ROBERT, junior.—*This invention received Provisional Protection, but notice to proceed with the application for*

Letters Patent was not given within the time prescribed by the Act. —From the Provisional Specification it appears that the invention related to the application of clocks actuated by electricity, to street and other lamps, and consisted in placing an electro-magnet in the upper framing of the lamp, and, opposite to each end of the magnet, a bell crank lever of soft iron, vibrating on its axis at an angle; a single connecting rod is jointed to one arm of each of these levers, while the opposite ends of the levers are presented to the action of the magnet. The rod moves through guides, and is furnished with a pall which engages with the teeth of a ratchet wheel, and thereby the clock hands are acted on. Every time the electro-magnet is excited by the action of the current, it attracts the levers, and thus, by means of the rod and ratchet wheel, the clock hands are moved. The invention also related to the arrangement of the dial, which "is placed inside the exterior glass of the " lamp; the minute wheels are confined within another curved " glass interior of the lamp, which is ground or painted, or " stained, and so inclined and arranged as to allow a sufficient " space at the top of the lantern for lodging the electro-magnet " and other parts."

[Printed 3*d.*]

A.D. 1856, August 19.—N° 1933.

OSMAN, HENRY FORFAR (*a communication*).—Relates to electric clocks. When the electro-magnet is charged, the armature is drawn towards it, by which means two arms of a lever attached to it are acted on, and the upper arm, by means of a click, drives the seconds wheel one tooth, (which seconds wheel governs the rest of the wheel-work,) while the lower arm descends, and a weight attached thereto descends with it. This weight, by being received on the head of a screw, fixed in an extended arm of the pendulum, restores to the pendulum the force lost after every two oscillations. By the oscillations of the pendulum two platina pins are alternately separated and brought into contact, the effect of their coming into contact being to close the electric current.

[Printed, 7*d.*]

A.D. 1856, August, 19.—N° 1934.

NOYER, PIERRE.—Relates to winding and setting watches without a key. A wheel is fixed on the axis of a fusee under the dial;

a lever is fixed at one end on the plate with a collet screw, the lever being left sufficiently free to have a slight motion backwards and forwards; in the centre of this lever is fixed another wheel (intended to propel the first mentioned wheel,) which is always in gear with a pinion whose axis passes through the whole length of the pendant. On the end of this axis is an indented knob to wind up with. There is a small spring which is coiled round a groove turned on the wheel which is on the lever, its other end being fastened to the plate. The action of this spring is treble. It prevents the last-mentioned wheel being in gear with the fusee wheel until the knob is turned to wind up, when it prevents the wheel turning on its own axis, and causes the lever to advance and thus throw the wheels into gear, when the winding up takes place, and when the knob is no more acted upon, the wheels are thrown out of gear again by the spring.

The hands are set by pushing a little piece which projects from the side of the case, and is connected with a sliding piece carrying a pinion, which engages the minute wheel and the wheel on the lever. Instead of the lever, may be used a sliding piece, which carries the wheel in the same manner as the lever does as above.

[Printed, 7*d*.]

A.D. 1856, September 5.—N° 2068.

MITCHELL, WILLIAM SMITH, and GÄRTNER, CHARLES MARTIN ERNEST.—1. Actuating the fusee arbor wheel for winding up the watch, and the minute wheel for setting the hands by means of a centre wheel and two pinions mounted on a rock lever, the centre wheel being moved through the pendant, and the driving pinions being kept out of gear, when not required, by springs.

2. Actuating the regulator of a watch by having a "lever with "a knife edge" connected to one side of the regulator, and fitting into the threads of a finely threaded screw, so that by giving a slight turn to the screw, extremely slight alterations in the regulator may be effected. This lever, when required, may be made to "slide "over the screw so as to adjust the watch roughly in the ordinary "way."

[Printed, 7d.]

A.D. 1856, September 5.—N° 2069.

REEDER, Ralph.—" An improved universal dial and chrono-" meter compass." The patentee thus describes the nature of his invention :—" I construct gimbals or rings similar to those of a " marine compass, receiving the parts, and properly weighted so " as to hang level, and attach to said gimbals an arc graduated " so as to adjust a plate carrying a chronometer, and around which " is a ring or equator, and by the aforesaid arc this is adjusted " according to the latitude of the location. The before-mentioned " chronometer is constructed to revolve once in twenty-four hours, " carrying a sight or gnomon. By this means the gnomon will " follow the motion of the sun or any of the heavenly bodies; " hence, if the chronometer be correct, the line of sight or shadow " from the gnomon on the equator will determine the position of " the twelve o'clock divisions of said equator, and the meridian " line of said heavenly body." To use the above to correct local variations in the magnetic needle, he places below it " a properly " constructed compass, with the north and south points of the " box on the same vertical plane as the 12 figures of the equatorial " ring."

[Printed, 7*d.*]

A.D. 1856, September 19.—N° 2205.

HEES, Richard Van (*a communication from Raymond Kammerer*).—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* The invention appears to have been identical with N° 45.

[Printed, 3*d.*]

A.D. 1856, October 17.—N° 2432.

MORTON, George.—Relates to escapements. The scape wheel is locked on the " outer and inner flanches of a hollow cylinder, " cut nearly half through." Fixed on the cylinder axis is a steel arm pointing towards the balance staff; on the end of this arm are two steel-tempered pins. The locking and unlocking is performed by a ruby, shaped like the tooth of a spur wheel, carried by a roller fixed on the balance axis. When the balance moves in one direction, this ruby enters between the two pins and turns the cylinder a short way round, thereby unlocking the tooth of the scape wheel, another tooth of which then gives the impulse to the impulse pallet on the balance axis; the liberated tooth then falls on the inside flange of the cylinder, and remains there until the return of the balance, when the ruby again enters the pins and unlocks the tooth from the inside flange; the next tooth then drops on the outer flange with a short drop, when the action is repeated.

[Printed, 7*d.*]

A.D. 1856, December 23.—N° 3045.

BAILLY, Julien Louis Guillaume.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* The invention seeems to have consisted in using the power of the wind as the motive power to maintain the action of clocks. By means of a small windmill, or any other suitable vane, the patentee proposed to communicate the power to a shaft or arbor on which he placed an endless screw, which screw gave motion to the train of wheels.

[Printed, 3*d.*]

1857.

A.D. 1857, February 10.—N° 389.

WATSON, John Forrest.—Constructing an outer case for a watch. The case consists of a ring, round which is made a rib or projection, which forms a rest for a circular enlargement or flange on the inner case, which, when placed there, is held fast by a bolt or catch or other suitable fastening. On the ring is hinged at one side a metal back, and at the other an open ring. The watch can be placed either with its face or back to the open ring, so as to form an ordinary or a hunting watch. The handle or pendant is fixed on the outer case.

[Printed, 5*d.*]

A.D. 1857, February 20.—N° 501.

GLOVER, JOSEPH, and BOLD, JOHN, the younger.—Printing by photographic means on substances suitable for dials and tablets; the surface of the substance being first prepared by reducing or deadening the surface thereof by means of fluoric acid.

[Printed, 3*d*.]

INDEX OF SUBJECT MATTER.

[The numbers refer to the page in which the Specification containing the subject commences.]

- Alarum:
  - Brown, 38.
  - Massey, 48.
  - Meusnier, 92.
  - Ulrich, 40.
  - Detached alarum watch;
    - Berrollas, 36.
  - Horological;
    - Maurel, 90.
  - In illuminated clocks;
    - Trotman, 96.
  - Marine;
    - De Lafons, 23.
  - Use of tubes of sand;
    - Le Mesurier, 88.
- Balance:
  - Gowland, 41.
  - Kehlhoff, 7.
  - Philcox, 78.
  - Arms out of the radial line;
    - Eiffe, 66.
  - Axis shaped like crank;
    - Mathew, 24.
  - Burnishing periphery of;
    - Eiffe, 66.
  - Compensation of;
    - Arnold, 33.
    - Litherland, 31.
  - Detached;
    - Ulrich, 35.
  - Equalizing vibrations;
    - Ulrich, 112.
  - Magnetic;
    - Bain, 61.
    - Weare, 65.
  - Motion to, without friction;
    - Leslie, 16.
  - Strikes a bell;
    - White, 14.
  - Suspended by spring;
    - Massey, 28.
  - Unlocking train independent of;
    - Ulrich, 35.
- Balance-staff:
  - Quaife, 88.
- Banking-pins:
  - Dispensing with;
    - Walker, 48.
  - On the arms of balance;
    - Nicole, 54.
- Bezils:
  - Baker, 98.
- Candle:
  - Snuffing;
    - Cartwright, 3.
    - White, 74.
  - Turning hands by upward movement of;
    - White, 74.
- Carriages:
  - Hill, 1.
  - Hadley, 2.
  - Application of clockwork to;
    - Chavanes, 98.
- Case:
  - Glass case for pendulum clock;
    - Loseby, 80.
  - Manufacture of clock cases;
    - Harcourt, 77.
  - Manufacture of watch cases;
    - O'Keeffe, 78, 89.
    - Quaife, 88.
    - Roper, 82.
    - Watson, 120.
  - Opening by spring-knuckle;
    - Brown, 38.
- Centrifugal force:
  - Baker, 89.
- Chain:
  - Dispensing with;
    - Marie, 5.
    - Mesure, 115.
    - Worcester, 1.

12

Chain—*continued.*
- Endless;
  - Evans, 3.
- Links for;
  - Mackenzie, 15.
- Position of;
  - Tolhausen, 115.

Chronometer:
- Hydrostatical or Pneumatical;
  - Rentzsch, 29.
- Mounting;
  - Johnson, 115.
  - Ulrich, 112.
- Phantasmagoric;
  - Schmidt, 26.

Clocks:
- Electric;
  - Bain, 50, 55, 61, 73.
  - Bellford, 99.
  - Brett, 60.
  - Brown, 71.
  - Osman, 117.
  - Shepherd, 69.
- Applied to street lamps;
  - Detouche, 116.
- Hydraulic;
  - Tiffereau, 72.
- Illuminated;
  - Bond, 22.
  - Knipsehaar, 84.
  - Trotman, 96.
- Illuminating—
  - Apparatus for;
    - Watson, 87.
  - Ground glass cylinders for;
    - Heinhold, 97.
- Musical;
  - Payne, 69.
- Night clocks;
  - Heinhold, 97.
  - Knipsehaar, 84.
  - Trotman, 96.
- Suspending, by cord round the barrel cylinder;
  - Newton, 58.
- To go 504 days;
  - Tolhausen, 116.
- To show time at two places;
  - Leslie, 16.
- Turret;
  - Matthias, 76.
  - Roberts, 68.
- Regulating, by astronomical clock;
  - Loseby, 80.

Compass:
- Combined with dial;
  - Sandoz, 91.
- Combined with watch;
  - Peckham, 20.
- Universal dial and chronometer;
  - *Reeder, 119.*

Compensation:
- Hutton, 58.
- Litherland, 15.
- Ulrich, 112.
- Curbs;
  - Cole, 33.
  - Massey, 30.
  - Ulrich, 112.
- Collets;
  - Hutton, 58.
- Of balance and balance spring;
  - Arnold, 11.
  - Litherland, 31.
  - Restell, 67, 76.
  - Roberts, 68.
  - Tolhausen, 115.
  - Ulrich, 40.
  - Wright, 12.
- Of pendulum and pendulum spring;
  - Arnold, 10.
  - Dent, 46.
  - Massey, 48.
  - Ulrich, 40.
  - Wright, 12.
- Secondary pieces;
  - Dent, 49.
  - Molyneux, 44.
- Tubes filled with mercury;
  - Loseby, 80.
- Use of thermometer and barometer;
  - Hutton, 58.

Detent:
- Berrollas, 63.
- Hanson, 56.
- Litherland, 31.
- Loseby, 80.
- Massey, 41.
- Restell, 67.
- Preventing concussion of;
  - Ulrich, 112.
- Preventing vibration of;
  - Ulrich, 35.
- Safety pin to;
  - Cole, 33.

Dials:
- Applied to street lamps;
  - Detouche, 116.
- Applied to moderateur lamps;
  - Choisnet, 101.
- Combination of two concentric;
  - Heinhold, 97.
- Electrotyped;
  - Piggott, 55.
- Embossing and engraving;
  - Webb, 82.
- Enamelled;
  - Bond, 22.
  - Edwards, 83.
- For use at sea;
  - Tobias, 29.
- Glass;
  - Smeeton, 87.

Dials—*continued.*
- Illuminated;
  - Pace, 39.
- Manufacture of;
  - Minton, 72.
  - Newton, 87.
  - Smeeton, 92.
- Nocturnal;
  - Schmidt, 26.
- Photography applied to;
  - Glover, 121.
- Revolving;
  - Harris, 8.
- Apparatus for marking;
  - Fatton, 34.
- Showing time simultaneously;
  - Roberts, 68.
- Transparent;
  - Bond, 22.
  - Roberts, 68.

Electric currents:
- Bain, 50, 61.
- Barwise, 47.
- Dobell, 93.
- Hatcher, 63.
- Nolet, 85.
- Whitehouse, 108.

Electric clocks. *See* Clocks.

Electric telegraphs:
- Bain, 50, 55.
- Brett, 60.

Escapement:
- Cole, 16, 33.
- Cummins, 91.
- Hunt, 31.
- Hutton, 58.
- Leslie, 16.
- Litherland, 14, 15, 31.
- Massey, 30, 42.
- Meusnier, 92.
- Morton, 119.
- Nicole, 54.
- Perrot, 104.
- Philcox, 43.
- Restell, 76.
- Stuart, 111.
- Tolhausen, 116.
- Ulrich, 38, 40.
- Wright, 12.
  - Detached;
    - Moenck, 66.
  - Detaching;
    - Webster, 105.
  - Dispensing with parts;
    - Restell, 67.
  - Horizontal—
    - with two wheels;
      - Tyrer, 10.
    - stems of different altitudes;
      - Westfield, 30.

Escapement—*continued.*
- Impulses—
  - equimotive;
    - Roberts, 68.
  - in the line of centres;
    - Philcox, 78.
  - reducing the number;
    - Macdowall, 42.
  - reducing friction;
    - Ulrich, 112.
- Used instead of pinions;
  - Small, 9.

Escape-wheels:
- Arnold, 11.
- Shepherd, 69.
- Smith, 29.
- Guard spring acting against;
  - Ulrich, 35.
- In connection with two balances;
  - Tolhausen, 115.
- In connection with pendulum;
  - Sant, 90.
- Number of teeth;
  - Yates, 60.
- One-toothed wheel in lieu of
  - McDowall, 73.
- Shape of teeth;
  - Quaife, 88.
  - Walker, 48.
- Use of two;
  - Dent, 49.
  - Wall, 31.

Flax:
- Hill, 1.

Fluids:
- Aeriform and liquid—
  - to measure time;
    - Lane, 94.
  - currents of;
    - Bain, 61.
- As motive power;
  - Kennedy, 75.

Frame-plates:
- Hardening and polishing;
  - Roberts, 68.

Fuzee:
- Dispensing with;
  - Mario, 5.
  - Matthias, 76.
  - Mesure, 115.
- Mechanism connected with;
  - Brown, 38.
- Position of;
  - Freeman, 8.
  - Mylne, 52.

Galvanic batteries:
- Bain, 61.
- Dering, 95.

Gas:
  Timepiece placed in;
    Dent, 46.

Glass:
  Substitute for sand glasses and glasses used at sea;
    De Lafons, 23.
    Gould, 21.

Guns:
  Hill, 1.

Gutta percha:
  Making clocks of;
    Johnson, 102.

Hands:
  Periodical advance of;
    Roberts, 68.
  Stopping;
    Ulrich, 40.
  Substitute for;
    Small, 9.

Hemp:
  Hill, 1.

Highwater:
  Showing the time of;
    Harris, 8.
    Haywood, 7.
    Sanderson, 6.

India-rubber:
  Making clocks of;
    Johnson, 102.

Instruments:
  Musical, applied to clocks;
    Chancellor, 28.
    Restell, 67.
  Mysterious circulator or chronological equilibrium;
    Schmidt, 26.
  To check watchmen and workmen;
    Adams, 104.
    Day, 21.
    Rowbotham, 79.

Key:
  Applied to the stands of clocks;
    Massey, 42.
    Robinson, 106.
  Closing the pipes of;
    Preddy, 71.
  Lunar and calendar;
    Sanderson, 6.
  To contain repeating parts of a watch:
    Norton, 8.
  To turn either way;
    Harlow, 14.
    Smith, 98.

Lever:
  Alternating;
    Gowland, 40.
  Compensating adjustable;
    Eiffe, 66.
  Diamond;
    Philcox, 43.
  Escapement;
    Quaife, 88.
  In alarum;
    Berrollas, 36.
  In connection with hammers;
    Eiffe, 66.
  Instead of detent spring;
    Bradshaw, 100.
  Instead of wheels;
    Small, 9.
  On separate axes with concentric motion;
    Matthew, 24.
  Remontoir spring;
    Ulrich, 35.
  With equal arms;
    Massey, 30.
  With arms at right angles;
    Hunt, 31.

Linen:
  Hill, 1.

Locking rim:
  Gowland, 41.

Machinery:
    Bennoch, 21.
    Gardner, 106.
    Ingold, 50, 52.
    Sanderson, 4.
  For drilling and boring;
    Roberts, 68.
  For registering the flow of liquid;
    Peace, 94.

Magnets:
  Electro;
    Hees, 119.
    Kammerer, 110.
    Whitehouse, 108.
  Permanent and fixed;
    Hatcher, 63.
  Setting clocks by voltaic;
    Hatcher, 63.

Mainspring:
    Leslie, 16.
  Use of two;
    Kehlhoff, 7.
    Ogston, 36.
    Savage, 24.
    Weber, 98.
  Use of three or more;
    Dent, 46.

Mercury:
  Compensation tubes;
    Loseby, 80.
  Influence of sun upon;
    Bain, 61.
  Regulating descent of;
    Peppe, 71.

Moderateur lamps:
  Choisnet, 101.

Month:
  Showing the day of;
    Harris, 8.
    Haywood, 7.
    Massey, 30.
    Meusnier, 92.
    Newton, 84.
    Pierret, 100.
    Sanderson, 6.
    Tolhausen, 116.

Moon:
  Showing age of;
    Harris, 8.
    Haywood, 7.
    Massey, 30.
    Sanderson, 6.
  Showing increase and decrease of;
    Sanderson, 6.
    Schmidt, 26.

Motive-power:
  Balls falling on a wheel or floating on sinking water;
    Mosley, 11.
  Detached weights;
    Moinau, 44.
  Stream of water;
    Millar, 79.
  The action of walking;
    Fischer, 13.
    Recordon, 10.
  The flowing of the tide;
    Roberts, 68.
  The use of fluid as the;
    Kennedy, 75.
  The wind;
    Bailly, 119.

Movement:
  Circular;
    Evans, 3.
  Excentric;
    Baker, 39.

Oxidation:
  Of platina points;
    Shepherd, 69.
  Prevention of;
    Dent, 29.
    Ulrich, 49.

Pallets:
    Banister, 40.
    Littlewort, 29.
    Massey, 45.
    Restell, 76.
    Shepherd, 69.
    Stuart, 111.

Pedometer:
  Gout, 28.

Pendulums:
    Arnold, 10.
    Banister, 40.
    Bellford, 99.
    Congreve, 25.
    Harris, 8.
    Hill, 1.
    Leslie, 16.
    Luedeke, 77.
    Tolhausen, 116.
  Dispensing with;
    Restell, 76.
  Electricity applied to;
    Weare, 65.
  Equalizing arcs of oscillation;
    Loseby, 80.
  Graham's mercurial;
    Eiffe, 66.
  Impulse to;
    Dent, 46.
  Keeping the same time;
    Bain, 50.
  Striking the bell;
    White, 14.
  Varying sectional area of;
    Hutton, 58.
  Vibrations isochronal;
    Small, 9.

Photography:
  Applied to dials;
    Glover, 121.

Pillars of clocks:
  Embossing;
    Poole, 108.

Pillar plates:
  Sinks in;
    Mylne, 82.

Pinions:
  Escapement instead of;
    Small, 9.
  Number of teeth;
    Healey, 3.
  Spiral instead of;
    Tonks, 101.
  Under the barrel;
    Westwood, 98.

Pivots:
  Hill, 1.

Platina:
- Stopping holes with;
  - Mathew, 24.

Power:
- To the twelve-hour action;
  - Matthias, 76.

Regulator:
- Bosley, 3.
- Cole, 33.
- Leslie, 16.
- Mitchell, 118.

Remontoir:
- Durillier, 96.
- Eiffe, 66.
- Matthias, 76.
- Shepherd, 69.
- Ulrich, 112.

Renovator:
- Additional wheel and apparatus;
  - Prior, 32.

Repeater:
- Berrollas, 26.
- Elliot, 22, 23.
- Leslie, 16.
- Norton, 8.
- Richoux, 114.
- Rowning, 3.
- Seyffert, 32.
- Webster, 8.

Ring:
- Glass filled with fluid;
  - Rentzsch, 29.
- Lunar or calendar;
  - Haywood, 7.

Second hand:
- Jaccard, 103.
- Additional;
  - Gougy, 43.
  - Nicole, 54.
- Putting in and out of action;
  - Johnson, 109.

Seconds:
- To beat dead;
  - Litherland, 15.
  - Roberts, 68.
- To beat distinct or half;
  - Boreham, 86.
  - Bradshaw, 100.
- To beat at the 60th;
  - Borcham, 86.

Setting:
- Clocks,
  - By the falling of a ball;
    - Bain, 61.

Setting—*continued.*
  - By electric currents;
    - Bain, 61.
  - By voltaic magnets;
    - Hatcher, 63.
- Hands,
  - Nicole, 106.
  - Through the pendant;
    - Huguenin, 105.
  - Without key;
    - Mitchell, 118.
    - Noyer, 117.

Spiral:
- Instead of pinion;
  - Tunks, 101.

Spring:
  - Luedeke, 77.
  - Philcox, 78.
- Dispensing with;
  - Restell, 67.
- Helical;
  - Arnold, 11.
  - Prior, 32.
- Instead of pallet;
  - Hanson, 56.
- Renovating;
  - Haley, 18.
- To secure watches to the dress;
  - Cartwright, 3.
- Use of two;
  - Philcox, 57.
- Use of, as motive-power;
  - Holl, 74.

Stones:
- Precious and other—art of working;
  - Facio, 2.

Striking part:
  - Bain, 61.
  - Berrollas, 27.
  - Brown, 38.
  - Leslie, 16.
  - Norton, 8.
  - Roberts, 68.
  - Rowning, 3.
  - Trusted, 19.
  - Ulrich, 40.

Sun:
- Influence of rays on mercury; and on thermo-electric pile;
  - Bain, 61.

Sundials:
- Addison, 78.
- Hopkins, 80.
- Newton, 43.

Syphons :
Application of, to clocks;
Tiffereau, 72.

Time :
Shown,
At two places at once;
Leslie, 16.
At all parts of the world;
Radford, 94.
By the falling of sand or mercury;
Mosley, 12.

Time measurer :
Detached body;
Congreve, 25.
Detachment of from first mover;
Congreve, 25.

Time-keepers :
Binnacle;
Tobias, 29.
Portable illuminated;
Pace, 39.
Self-winding;
Recordon, 10.
Vertical, with horizontal wheels;
Massey, 28.
Working by magnetic balances;
Bain, 61.

Travellers' monitor, or ticket and parcel protector :
Kibble, 83.

Tripping :
Prevention of;
Ulrich, 112.

Vacuum :
Clock acting in;
Manton, 24.

Verge :
Massey, 42.

Vibrating body :
White, 14.

Watch :
Central stop;
Freeman, 8.
Divided into two compartments;
Chauffourier, 69.
Geometrical and pedometrical;
Fischer, 13.
Guard, for watches and notes;
Chater, 14.
Gandibert, 105.

Watch—*continued.*
Pedometrical;
Gout, 20.
To go for 8 days;
Mesure, 115.
Warning;
Berrollas, 27.

Watch cases. *See* "Case."

Watchmen. *See* "Instrument."

Week :
Showing the day of;
Meusnier, 92.
Newton, 84.
Pierret, 100.

Weight.
Compensation;
Lund, 52.
Of clock, the propelling power;
Newton, 58.
Suspended to balance;
Johnston, 46.

Wheels :
Additional;
Prior, 32.
Double;
Luedeke, 77.
Balance wheel with two circles;
Kehlhoff, 7.
Hanging the spindles of;
Littlewort, 39.
Horizontal;
Freeman, 8.
Kehlhoff, 7.
Massey, 28.
Number of;
Small, 9.
Position of;
Freeman, 8.
Marie, 5.
Westwood, 38.
Use of one only;
Hadley, 2.
Use of two on one arbor;
Mathew, 24.
With contrate teeth;
Mathew, 24.
With epicycloidal teeth;
Arnold, 11.
With roughened circumferences;
Small, 9.
With teeth taken out, and sloped off;
Marsh, 28.

Winding up :
Nicole, 106.
Arbor passing through a stuffing-box;
Dent, 48.

Winding up—*continued.*
- **At the stand of the clock;**
  - **Massey, 42.**
  - **Robinson, 106.**
- **By permanent mechanism;**
  - **Newton, 102.**
- **By pendant;**
  - **Berrollas, 37.**
  - **Huguenin, 105.**
  - **Leslie, 16.**
  - **Massey, 30, 47, 48.**
  - **Nicole, 54.**
  - **Prest, 33.**
- **By walking;**
  - **Recordon, 10.**
- **By one turn;**
  - **Marie, 5.**
- **By electricity;**
  - **Bain, 61.**
  - **Shepherd, 69.**
- **The time keeping action by winding up the striking action;**
  - **Matthias, 76.**
- **To go for 12 months;**
  - **Davies, 45.**
- **To go for a long period;**
  - **Poncy, 45.**
- **To go for 8 or more days**
  - **Dent, 46.**
- **Too far;**
  - **Perrin, 50.**
  - **Power, 96.**
- **Two or more barrels;**
  - **Dent, 46.**
- **Without a key**
  - **Brown, 38.**
  - **Durillier, 96.**
  - **Litherland, 15.**
  - **Mitchell, 118.**
  - **Noyer, 117.**

Wrong way:
- **Marie, 5.**
- **Power, 96.**

Year:
- **Showing day of;**
  - **Meusnier, 92.**
  - **Newton, 84.**
  - **Tolhausen, 116.**

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